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CURIS RESOURCES (ARIZONA) INC.

March 25, 2011

Mr. David Albright, Manager
Ground Water Office **WTR-9**
United States Environmental Protection Agency
Region 9
75 Hawthorne Street
San Francisco, California, CA 94105-3901

Re: Request for Modification and Transfer of Underground Injection Control Permit No. AZ396000001 from Florence Copper, Inc. to Curis Resources (Arizona) Inc.

Dear Mr. Albright:

The enclosed Underground Injection Control (UIC) Program Permit application (Application) is submitted to Region 9 of the United States Environmental Protection Agency (USEPA) in response to your letter of August 5, 2010 regarding the referenced request of Curis Resources (Arizona) Inc. (Curis Arizona) for the modification and transfer of UIC Permit No. AZ396000001 (UIC Permit) from Florence Copper Inc. to Curis Arizona.

The enclosed Application documents include:

- a completed and signed UIC Permit Application form (EPA Form 7520-6) and all attachments required by the instructions included with the form;
- a master Table of Contents identifying all attachments and all figures, tables, and exhibits submitted with the attachments;
- a glossary and table of acronyms; and
- a table showing existing UIC Permit provisions and proposed amendments to some of those provisions.

A copy of Curis Arizona's January 31, 2011 application to the Arizona Department of Environmental Quality (ADEQ) to amend and transfer the related Aquifer Protection Permit No. 101704 (APP, and APP Application) is enclosed with this submittal. Some of the attachments to this Application refer to information contained in attachments to the APP Application and *vice versa*. To minimize duplication and to assist with agency review, Curis Arizona is thus enclosing a copy of the APP Application with this Application and is providing copies of this letter and all enclosed Application documents to ADEQ.

Curis Resources (Arizona) Inc. 1575 W. Hunt Highway Florence AZ 85132 USA
T +1.520.374.3984 | TF 1.800.667.2114 | F +1.520.374.3999 **florencecopperproject.com**

The attachments to this Application, in conjunction with the referenced attachments to the APP Application, update and build upon information that formed the basis for the APP and the UIC Permit that were originally issued to BHP Copper Inc. in 1997. The attachments provide a comprehensive description of all facets of Curis Arizona's proposal to develop an *in-situ* copper recovery (ISCR) facility at the Florence Copper Project (FCP) site. Key aspects of the proposed development relative to the UIC Permit include:

- No proposed change to the lateral or vertical boundaries of the existing aquifer exemption.
- No proposed change to the boundary of the ISCR area, the area within the aquifer exemption in which the construction and operation of injection and recovery wells are authorized.
- No proposed change to the area of review (AOR), even though recent computer models justify substantial reductions in the AOR's size.
- Improved and updated design of injection and recovery wells.
- Improved and updated procedures for ensuring mechanical integrity of injection and recovery wells.
- Two phases of FCP development:
  - Phase 1 will involve the construction of a pilot-scale Production Test Facility (PTF), including 24 test wells, which will operate for approximately 14 months while maintaining hydraulic control to generate sufficiently concentrated ISCR solutions needed for:
    - forecasting solution characteristics over the operating life of the FCP; and
    - evaluating treatment and recovery technologies for use during commercial operations to increase groundwater conservation by increasing copper recovery efficiencies, by re-using treated groundwater, and by reducing the amount of water and related sediment required to be placed in water impoundments.
  - Phase 2 will involve the sequential development of the ISCR area in accordance with UIC Permit requirements, the installation and operation of surface facilities that will meet ADEQ's "best available demonstrated control technology" criteria, and the processing of ISCR solutions in accordance with UIC Permit requirements and information gained from Phase 1.
- A comprehensive facility and groundwater monitoring program that has a 15-year database of groundwater quality at point of compliance wells surrounding the ISCR area.
- Financial assurance covering detailed closure and post-closure estimates for Phase 1 and 2 operations.

Additionally, Curis Arizona has retained consultants to evaluate compliance of the proposed FCP with the National Historic Preservation Act and the Endangered Species Act, and will shortly submit reports to you under separate cover documenting those compliance activities.

We trust that the enclosed documents demonstrate Curis Arizona's technological, financial, and environmental commitment to the sustainable construction, operation, and closure of the FCP. We look forward to working closely with USEPA during your review of our Application, and are available to meet with you and your staff at your convenience to discuss the information in the Application. As a first step, we request a progress meeting with you within the next 6 weeks to discuss your initial findings.

Please contact Ms. Loretta Ford, Senior Manager, Environment and Sustainability, at +1.604.684.6365 (ext. 6762) if you have questions about the enclosed documents or require additional information.

Sincerely,

Curis Resources (Arizona) Inc.

Michael McPhie, B.Sc, M.Sc., QEP
President and Chief Executive Officer

Enc: Signed Underground Injection Control Permit Application Form, with attachments
Aquifer Protection Program Permit amendment application

OMB No. 2040-0042 Approval Expires 12/31/2011

United States Environmental Protection Agency

EPA

Underground Injection Control Permit Application

(Collected under the authority of the Safe Drinking Water Act. Sections 1421, 1422, 40 CFR 144)

I. EPA ID Number		T/A	C
U			

Read Attached Instructions Before Starting

For Official Use Only

Application approved mo day year	Date received mo day year	Permit Number	Well ID	FINDS Number

II. Owner Name and Address

Owner Name	Street Address	Phone Number	City	State	ZIP CODE
Curis Resources (Arizona) Inc.	1575 W. Hunt Highway	(520) 374-3984	Florence	AZ	85132

III. Operator Name and Address

Owner Name	Street Address	Phone Number	City	State	ZIP CODE
Same	Same		Same		

IV. Commercial Facility

- [x] Yes
- [ ] No

V. Ownership

- [x] Private
- [ ] Federal
- [ ] Other

VI. Legal Contact

- [x] Owner
- [ ] Operator

VII. SIC Codes

SIC-1021
SIC-3331

VIII. Well Status *(Mark "x")*

- [ ] A. Operating — Date Started mo day year:
- [ ] B. Modification/Conversion
- [x] C. Proposed

IX. Type of Permit Requested *(Mark "x" and specify if required)*

- [ ] A. Individual
- [x] B. Area

Number of Existing Wells	Number of Proposed Wells	Name(s) of field(s) or project(s)
21	2,500	Florence Copper Project

X. Class and Type of Well *(see reverse)*

A. Class(es) (enter code(s))	B. Type(s) (enter code(s))	C. If class is "other" or type is code 'x,' explain	D. Number of wells per type (if area permit)
III	G		2,500

XI. Location of Well(s) or Approximate Center of Field or Project

Latitude Deg	Min	Sec	Longitude Deg	Min	Sec	Township and Range Sec	Twp	Range	1/4 Sec	Feet From	Line	Feet From	Line
33	02	56	111	25	52	28,33	4S	9E					

XII. Indian Lands (Mark 'x')

- [ ] Yes
- [x] No

XIII. Attachments

(Complete the following questions on a separate sheet(s) and number accordingly; see instructions)

For Classes I, II, III, (and other classes) complete and submit on a separate sheet(s) Attachments A--U (pp 2-6) as appropriate. Attach maps where required. List attachments by letter which are applicable and are included with your application.

XIV. Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

A. Name and Title *(Type or Print)*	B. Phone No. *(Area Code and No.)*
Michael McPhie, President and Chief Executive Officer	(604) 684-6365
C. Signature: Michael McPhie	D. Date Signed: March 25, 2011

EPA Form 7520-6 (Rev. 12-08)

Well Class and Type Codes

Class I Wells used to inject waste below the deepest underground source of drinking water.

Type **"I"** Nonhazardous industrial disposal well
"M" Nonhazardous municipal disposal well
"W" Hazardous waste disposal well injecting below USDWs
"X" Other Class I wells (not included in Type "I," "M," or "W")

Class II Oil and gas production and storage related injection wells.

Type **"D"** Produced fluid disposal well
"R" Enhanced recovery well
"H" Hydrocarbon storage well (excluding natural gas)
"X" Other Class II wells (not included in Type "D," "R," or "H")

Class III Special process injection wells.

Type **"G"** Solution mining well
"S" Sulfur mining well by Frasch process
"U" Uranium mining well (excluding solution mining of conventional mines)
"X" Other Class III wells (not included in Type "G," "S," or "U")

Other Classes Wells not included in classes above.
Class V wells which may be permitted under §144.12.
Wells not currently classified as Class I, II, III, or V.

Attachments to Permit Application

Class	**Attachments**
I new well	A, B, C, D, F, H – S, U
existing	A, B, C, D, F, H – U
II new well	A, B, C, E, G, H, M, Q, R; optional – I, J, K, O, P, U
existing	A, E, G, H, M, Q, R, – U; optional – J, K, O, P, Q
III new well	A, B, C, D, F, H, I, J, K, M – S, U
existing	A, B, C, D, F, H, J, K, M – U
Other Classes	To be specified by the permitting authority

INSTRUCTIONS - Underground Injection Control (UIC) Permit Application

Paperwork Reduction Act: The public reporting and record keeping burden for this collection of information is estimated to average 224 hours for a Class I hazardous well application, 110 hours for a Class I non-hazardous well application, 67 hours for a Class II well application, and 132 hours for a Class III well application. Burden means the total time, effort, or financial resource expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal Agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to the collection of information; search data sources; complete and review the collection of information; and, transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including the use of automated collection techniques to Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822), 1200 Pennsylvania Ave., NW, Washington, DC 20460. Include the OMB control number in any correspondence. Do not send the completed forms to this address.

This form must be completed by all owners or operators of Class I, II, and III injection wells and others who may be directed to apply for permit by the Director.

I. **EPA I.D. NUMBER** - Fill in your EPA Identification Number. If you do not have a number, leave blank.

II. **OWNER NAME AND ADDRESS** - Name of well, well field or company and address.

III. **OPERATOR NAME AND ADDRESS** - Name and address of operator of well or well field.

IV. **COMMERCIAL FACILITY** - Mark the appropriate box to indicate the type of facility.

V. **OWNERSHIP** - Mark the appropriate box to indicate the type of ownership.

VI. **LEGAL CONTACT** - Mark the appropriate box.

VII. **SIC CODES** - List at least one and no more than four Standard Industrial Classification (SIC) Codes that best describe the nature of the business in order of priority.

VIII. **WELL STATUS** - Mark Box A if the well(s) were operating as injection wells on the effective date of the UIC Program for the State. Mark Box B if wells(s) existed on the effective date of the UIC Program for the State but were not utilized for injection. Box C should be marked if the application is for an underground injection project not constructed or not completed by the effective date of the UIC Program for the State.

IX. **TYPE OF PERMIT** - Mark "Individual" or "Area" to indicate the type of permit desired. Note that area permits are at the discretion of the Director and that wells covered by an area permit must be at one site, under the control of one person and do not inject hazardous waste. If an area permit is requested the number of wells to be included in the permit must be specified and the wells described and identified by location. If the area has a commonly used name, such as the "Jay Field," submit the name in the space provided. In the case of a project or field which crosses State lines, it may be possible to consider an area permit if EPA has jurisdiction in both States. Each such case will be considered individually, if the owner/operator elects to seek an area permit.

X. **CLASS AND TYPE OF WELL** - Enter in these two positions the Class and type of injection well for which a permit is requested. Use the most pertinent code selected from the list on the reverse side of the application. When selecting type X please explain in the space provided.

XI. **LOCATION OF WELL** - Enter the latitude and longitude of the existing or proposed well expressed in degrees, minutes, and seconds or the location by township, and range, and section, as required by 40 CFR Part 146. If an area permit is being requested, give the latitude and longitude of the approximate center of the area.

XII. **INDIAN LANDS** - Place an "X" in the box if any part of the facility is located on Indian lands.

XIII. **ATTACHMENTS** - Note that information requirements vary depending on the injection well class and status. Attachments for Class I, II, III are described on pages 4 and 5 of this document and listed by Class on page 2. Place EPA ID number in the upper right hand corner of each page of the Attachments.

XIV. **CERTIFICATION** - All permit applications (except Class II) must be signed by a responsible corporate officer for a corporation, by a general partner for a partnership, by the proprietor of a sole proprietorship, and by a principal executive or ranking elected official for a public agency. For Class II, the person described above should sign, or a representative duly authorized in writing.

INSTRUCTIONS - Attachments

Attachments to be submitted with permit application for Class I, II, III and other wells.

A. **AREA OF REVIEW METHODS** - Give the methods and, if appropriate, the calculations used to determine the size of the area of review (fixed radius or equation). The area of review shall be a fixed radius of 1/4 mile from the well bore unless the use of an equation is approved in advance by the Director.

B. **MAPS OF WELL/AREA AND AREA OF REVIEW** - Submit a topographic map, extending one mile beyond the property boundaries, showing the injection well(s) or project area for which a permit is sought and the applicable area of review. The map must show all intake and discharge structures and all hazardous waste treatment, storage, or disposal facilities. If the application is for an area permit, the map should show the distribution manifold (if applicable) applying injection fluid to all wells in the area, including all system monitoring points. Within the area of review, the map must show the following:

Class I

The number, or name, and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, mines (surface and subsurface), quarries, and other pertinent surface features, including residences and roads, and faults, if known or suspected. In addition, the map must identify those wells, springs, other surface water bodies, and drinking water wells located within one quarter mile of the facility property boundary. Only information of public record is required to be included in this map;

Class II

In addition to requirements for Class I, include pertinent information known to the applicant. This requirement does not apply to existing Class II wells;

Class III

In addition to requirements for Class I, include public water systems and pertinent information known to the applicant.

C. **CORRECTIVE ACTION PLAN AND WELL DATA** - Submit a tabulation of data reasonably available from public records or otherwise known to the applicant on all wells within the area of review, including those on the map required in B, which penetrate the proposed injection zone. Such data shall include the following:

Class I

A description of each well's types, construction, date drilled, location, depth, record of plugging and/or completion, and any additional information the Director may require. In the case of new injection wells, include the corrective action proposed to be taken by the applicant under 40 CFR 144.55.

Class II

In addition to requirement for Class I, in the case of Class II wells operating over the fracture pressure of the injection formation, all known wells within the area of review which penetrate formations affected by the increase in pressure. This requirement does not apply to existing Class II wells.

Class III

In addition to requirements for Class I, the corrective action proposed under 40 CFR 144.55 for all Class III wells.

D. **MAPS AND CROSS SECTION OF USDWs** - Submit maps and cross sections indicating the vertical limits of all underground sources of drinking water within the area of review (both vertical and lateral limits for Class I), their position relative to the injection formation and the direction of water movement, where known, in every underground source of drinking water which may be affected by the proposed injection. (Does not apply to Class II wells.)

E. **NAME AND DEPTH OF USDWs (CLASS II)** - For Class II wells, submit geologic name, and depth to bottom of all underground sources of drinking water which may be affected by the injection.

F. **MAPS AND CROSS SECTIONS OF GEOLOGIC STRUCTURE OF AREA** - Submit maps and cross sections detailing the geologic structure of the local area (including the lithology of injection and confining intervals) and generalized maps and cross sections illustrating the regional geologic setting. (Does not apply to Class II wells.)

G. **GEOLOGICAL DATA ON INJECTION AND CONFINING ZONES (Class II)** - For Class II wells, submit appropriate geological data on the injection zone and confining zones including lithologic description, geological name, thickness, depth and fracture pressure.

H. **OPERATING DATA** - Submit the following proposed operating data for each well (including all those to be covered by area permits): (1) average and maximum daily rate and volume of the fluids to be injected; (2) average and maximum injection pressure; (3) nature of annulus fluid; (4) for Class I wells, source and analysis of the chemical, physical, radiological and biological characteristics, including density and corrosiveness, of injection fluids; (5) for Class II wells, source and analysis of the physical and chemical characteristics of the injection fluid; (6) for Class III wells, a qualitative analysis and ranges in concentrations of all constituents of injected fluids. If the information is proprietary, maximum concentrations only may be submitted, but all records must be retained.

I. **FORMATION TESTING PROGRAM** - Describe the proposed formation testing program. For Class I wells the program must be designed to obtain data on fluid pressure, temperature, fracture pressure, other physical, chemical, and radiological characteristics of the injection matrix and physical and chemical characteristics of the formation fluids.

For Class II wells the testing program must be designed to obtain data on fluid pressure, estimated fracture pressure, physical and chemical characteristics of the injection zone. (Does not apply to existing Class II wells or projects.)

For Class III wells the testing must be designed to obtain data on fluid pressure, fracture pressure, and physical and chemical characteristics of the formation fluids if the formation is naturally water bearing. Only fracture pressure is required if the program formation is not water bearing. (Does not apply to existing Class III wells or projects.)

J. **STIMULATION PROGRAM** - Outline any proposed stimulation program.

K. **INJECTION PROCEDURES** - Describe the proposed injection procedures including pump, surge, tank, etc.

L. **CONSTRUCTION PROCEDURES** - Discuss the construction procedures (according to §146.12 for Class I, §146.22 for Class II, and §146.32 for Class III) to be utilized. This should include details of the casing and cementing program, logging procedures, deviation checks, and the drilling, testing and coring program, and proposed annulus fluid. (Request and submission of justifying data must be made to use an alternative to packer for Class I.)

M. **CONSTRUCTION DETAILS** - Submit schematic or other appropriate drawings of the surface and subsurface construction details of the well.

N. **CHANGES IN INJECTED FLUID** - Discuss expected changes in pressure, native fluid displacement, and direction of movement of injection fluid. (Class III wells only.)

O. **PLANS FOR WELL FAILURES** - Outline contingency plans (proposed plans, if any, for Class II) to cope with all shut-ins or wells failures, so as to prevent migration of fluids into any USDW.

P. **MONITORING PROGRAM** - Discuss the planned monitoring program. This should be thorough, including maps showing the number and location of monitoring wells as appropriate and discussion of monitoring devices, sampling frequency, and parameters measured. If a manifold monitoring program is utilized, pursuant to §146.23(b)(5), describe the program and compare it to individual well monitoring.

Q. **PLUGGING AND ABANDONMENT PLAN** - Submit a plan for plugging and abandonment of the well including: (1) describe the type, number, and placement (including the elevation of the top and bottom) of plugs to be used; (2) describe the type, grade, and quantity of cement to be used; and (3) describe the method to be used to place plugs, including the method used to place the well in a state of static equilibrium prior to placement of the plugs. Also for a Class III well that underlies or is in an exempted aquifer, demonstrate adequate protection of USDWs. Submit this information on EPA Form 7520-14, Plugging and Abandonment Plan.

R. **NECESSARY RESOURCES** - Submit evidence such as a surety bond or financial statement to verify that the resources necessary to close, plug or abandon the well are available.

S. **AQUIFER EXEMPTIONS** - If an aquifer exemption is requested, submit data necessary to demonstrate that the aquifer meets the following criteria: (1) does not serve as a source of drinking water; (2) cannot now and will not in the future serve as a source of drinking water; and (3) the TDS content of the ground water is more than 3,000 and less than 10,000 mg/l and is not reasonably expected to supply a public water system. Data to demonstrate that the aquifer is expected to be mineral or hydrocarbon production, such as general description of the mining zone, analysis of the amenability of the mining zone to the proposed method, and time table for proposed development must also be included. For additional information on aquifer exemptions, see 40 CFR Sections 144.7 and 146.04.

T. **EXISTING EPA PERMITS** - List program and permit number of any existing EPA permits, for example, NPDES, PSD, RCRA, etc.

U. **DESCRIPTION OF BUSINESS** - Give a brief description of the nature of the business.

CURIS RESOURCES (ARIZONA) INC.

FLORENCE COPPER PROJECT

APPLICATION TO AMEND UNDERGROUND INJECTION CONTROL PERMIT NO. AZ396000001

VOLUME 1 OF 2
Attachments A through F

March 2011

Master Table of Contents

ATTACHMENT M – WELL CONSTRUCTION DETAILS

ATTACHMENT N – CHANGES IN INJECTED FLUID

ATTACHMENT O – PLANS FOR WELL FAILURES (CONTINGENCY PLAN)

ATTACHMENT P – MONITORING PROGRAM

Master List of Figures

Master List of Tables

Master List of Exhibits

Glossary

Alert Level (AL): A numeric value that expresses the concentration, or physical or chemical properties, of selected groundwater constituents. With the exception of field parameters and common ions which will not be assigned ALs, ALs are established for Level 1 and Level 2 analytes using methods approved by the Director, including the methods for establishing ALs in the April 26, 2000 amendments to the UIC Permit.

Alteration: Any change in the mineralogic composition of a rock brought about by physical or chemical means, especially by the action of hydrothermal solutions; also, a secondary, i.e. supergene, change in a rock or mineral.

Analyte: A constituent, or a chemical or physical property of a constituent, that is analyzed or measured by chemical or physical means.

Anion: A negatively charged ion (as a hydroxide, chloride, or acetate ion).

Annulus: The space between the casing of a well and the well bore. Also, the space between the tubing and casing of a well. The annulus may be referred to as the "annular space."

Application Verification: Using the set of parameter values and boundary conditions from a calibrated model to verify a second set of field data measured under similar hydrologic conditions.

Aquifer: A geologic unit that contains sufficient saturated permeable material to yield usable quantities of water to a well or spring Arizona Revised Statutes ([A.R.S.] § 49-201.2). The Aquifer Boundary and Protected Use Classification Rules (Arizona Administrative Code [A.A.C.] R18-11-501.4) have defined "usable quantities" at 5 gallons per day (gpd).

Aquifer is defined (40 Code of Federal Regulations [CFR] 144.3) as a geological formation, group of formations, or part of a formation that is capable of yielding a significant amount of water to a well or spring.

Aquifer Exemption: Term relating to the act of designating an underground source of drinking water as an exempted aquifer. Term is also used to refer to documents designating exempted aquifers and to the three-dimensional space underground that encloses the exempted aquifer.

Aquifer Protection Permit No. 101704 (APP): The APP issued by Arizona Department of Environmental Quality (ADEQ) on June 9, 1997 for the construction and operation of *in-situ* copper recovery facilities at the Florence Copper Project (FCP) site. May also refer to any individual or general permit required by A.R.S. § 49-241.

Aquifer Quality Limit (AQL): AQLs shall be established for parameters with primary maximum contaminant levels (MCLs) established pursuant to 40 CFR 141. If the calculated AL is less than the MCL, then the AQL shall be set equal to the MCL. If the calculated AL is greater than the MCL, then the AQL shall be set equal to the AL.

Aquifer Water Quality Standards (AWQS):	AWQS means a standard established under A.R.S. §§ 49-221 and 49.223. Narrative AWQS are set forth in A.A.C. R18-11-405 and numeric AWQS are set forth in A.A.C. R18-11-406.
Area of Review:	Area around an injection well or, in case of area permit, the project area plus a circumscribing area the width of which is either ¼ of a mile or a number calculated according to the criteria set forth in 40 CFR 146.6.
Best Available Demonstrated Control Technology (BADCT):	The best available demonstrated control technology, process, operating method, or other alternative to achieve the greatest degree of discharge reduction determined for a facility by the ADEQ Director under A.R.S. § 49-243 and A.A.C. R18-9-101.7.
Calibration:	The process of refining a model representation of the hydrogeologic framework, hydraulic properties and boundary conditions to achieve a desired degree of correspondence between the model simulations and observations of the groundwater flow system.
Cation:	A positively charged ion (as a hydrogen, calcium, or ammonium ion).
Chemical Transport:	Chemical transport adds further refinement to a groundwater flow model by including simulation of chemical movement and distribution in a groundwater flow system. Chemical transport modeling may include diffusion, dispersion, chemical decay, and reactions between the chemical and the porous media.
Conceptual Model:	An interpretation or working description of the characteristics and dynamics of a physical system.
Constant Flux Boundary:	A numerical boundary condition in MODFLOW through which the inflow or outflow flux of groundwater remains constant, and does not vary due to changing groundwater flow gradients.
Director:	The Regional Administrator of Region 9, United States Environmental Protection Agency (USEPA), or the Director of the Region 9 Water Division acting on behalf of the Regional Administrator.
Discharge:	The addition of a pollutant from a facility either directly to an aquifer or to the land surface or the vadose zone in such a manner that there is a reasonable probability that the pollutant will reach an aquifer (A.R.S. § 49-201.12).
Discharge Impact Area (DIA):	The "potential areal extent of pollutant migration, as projected on the land surface, as the result of a discharge from a facility" (A.R.S. § 49-201.13).
Enrichment:	The supergene processes of mineral deposition, including near-surface oxidation, downward migration, and precipitation (e.g. sulfide enrichment).
Exempted Aquifer:	Aquifer, or portion of aquifer, that meets the criteria listed in 40 CFR 146.4 and that is designated as an exempted aquifer by the Director.
Facility (or Activity):	Any UIC injection well or other facility or activity that is subject to UIC regulation. Also, the Florence Copper Project property and related infrastructure (the FCP Facility), although not all of the FCP Facility is subject to UIC regulation.

Florence Copper Project (FCP): The land and related facilities owned and operated by Curis Resources (Arizona) Inc. for the production of copper using *in-situ* copper recovery (ISCR) technologies.

Flow Line: Is a representation of the direction of groundwater flow. Flow lines are always perpendicular to lines of equal groundwater elevation. Flow lines only converge in areas of groundwater discharge or recharge. A groundwater particle trace or pathline is the actual tortuous paths of the water molecules as they flow through pores, cracks and crevices of the soil or other aquifer material.

Fluid: A fluid is any material or substance which flows or moves whether in a semisolid, liquid, sludge, gas, or any other form or state.

Fracture Gradient: The fracture gradient is a measure of how the pressure required to fracture rock in the earth changes with depth. It is usually measured in units of "pounds per square inch per foot" (psi/ft) and varies with the type of rock and the stress history of the rock.

Formation: A body of consolidated or unconsolidated rock characterized by a degree of lithologic homogeneity which is prevailingly, but not necessarily, tabular and is mappable on the earth's surface or traceable in the subsurface

Formation Fluid: A fluid present in a formation under natural conditions, as opposed to introduced fluids, such as drilling mud.

General Head Boundary: The general head boundary is a numerical constraint in MODFLOW that simulates regional flow beyond the finite difference grid. The general head boundary will adjust the flux of water in or out of the model depending on simulated groundwater flow gradients.

Granodiorite: A group of coarse-grained plutonic rocks intermediate in composition between quartz diorite and quartz monzonite, containing quartz, plagioclase (oligoclase or andesine), and potassium feldspar, with biotite, hornblende, or more rarely, pyroxene, as the mafic components. The ratio of plagioclase to total feldspar is at least 2 to 1 but less than 9 to 10. With less alkali feldspar it grades into quartz diorite, and with more alkali feldspar, into granite or quartz monzonite.

Gravity Anomaly: The difference between the observed value of gravity at a point and the theoretically calculated value based on a simple gravity model, usually modified in accordance with some generalized hypothesis of subsurface density variation as related to surface topography.

Hydraulic Conductivity: Hydraulic conductivity describes the ease with which water can pass through an aquifer. The hydraulic conductivity multiplied by the thickness of the aquifer is equal to the transmissivity.

Hydraulic Control: Inward hydraulic gradient that prevents *in-situ* solutions from migrating beyond the portion of the oxide zone where injection and recovery of *in-situ* solutions is occurring.

Hydraulic Control Solution (HCS): Groundwater pumped to the surface from perimeter wells for the purpose of maintaining hydraulic control for an operational unit.

Hydraulic Gradient:	(a) In an aquifer, the rate of change of pressure head per unit of distance of flow at a given point and in a given direction. (b) In a stream, the slope of the hydraulic grade line.
Hydraulic Head:	(a) The height of the free surface of a body of water above a given subsurface point. (b) The water level at a point upstream from a given point downstream. (c) The elevation of the hydraulic grade line at a given point above a given point of a pressure pipe.
Hydrothermal:	Of or pertaining to heated water to the action of heated water, or to the products of the action of heated water, such as a mineral deposit precipitated from a hot aqueous solution, with or without demonstrable association with igneous process (also, said of the solution itself).
Hydrothermal Alteration:	Alteration of rocks or minerals by the reaction of hydrothermal water with pre-existing solid phases.
Injectate:	Generic term that may be applied to any fluid injected into the subsurface for any purpose (e.g., acidified aqueous solutions injected into the oxide zone for the dissolution and recovery of copper; groundwater injected into the oxide zone for rinsing the oxide zone; or groundwater containing sodium bicarbonate or other neutralizing agents to promote the precipitation of dissolved metals in the oxide zone).
Injectate Solution:	Solution specifically prepared for injection into the oxide zone for the sole purpose of dissolving and recovering the copper in the oxide zone. Also referred to as lixiviant. Injectate solution will be prepared from raffinate once the solvent extraction/electrowinning (SX/EW) plant begins operations; until that time, it will be prepared from groundwater.
Injection and Recovery Zone (IRZ):	A three-dimensional zone within the oxide zone where injection and recovery of *in-situ* solutions may take place.
Injection Well:	A well through which injectate is injected into the oxide zone under applied pressure or gravity flow.
***In-Situ* Copper Recovery (ISCR) Area:**	The portion of the FCP in which the installation and operation of injection and recovery wells was authorized by the USEPA in Underground Injection Control (UIC) Permit No. AZ 396000001 (UIC Permit) issued May 1, 1997. ISCR area is within the area for which USEPA issued an aquifer exemption in conjunction with the UIC Permit. The ISCR area was referred to as the "mine area" in the APP and in the UIC Permit issued in 1997.
***In-Situ* Copper Recovery (ISCR) Process**:	Process involving (1) the injection of an injectate solution or lixiviant into the oxide zone for the purpose of dissolving copper and (2) pumping the resulting copper-bearing solution (pregnant leach solution or PLS) to the surface for the recovery of the copper in an SX/EW plant.
***In-Situ* Copper Recovery (ISCR) Solutions**:	Also referred to as *in-situ* solutions and includes any injectate, raffinate, PLS, pre-stacked PLS, rinse water, solutions containing neutralization agents, or HCS.

Leak Collection and Removal System (LCRS):	An engineered assembly of components installed between the upper and lower liner of a double liner system that is designed to drain and remove liquids that may pass through the upper liner.
Level 1 Water Quality Parameters:	Parameters are based on Level 1 analytes, which include constituents of ISCR solutions that are monitored to provide an early indication of groundwater effects associated with the operation of the SX/EW plant and the ISCR facilities. Level 1 analytes are shown in Table 1 of the UIC Permit and are to be sampled at least once quarterly from each point of compliance (POC) well in accordance with the schedule described in Part II.F.4 of the UIC Permit.
Level 2 Water Quality Parameters:	Parameters are based on Level 2 analytes, which include conservative constituents most likely to be present in ISCR solutions and for which primary MCLs have been established pursuant to 40 CFR 141 and other relatively conservative constituents which are likely to appear in greater concentrations in ISCR-affected groundwater than in non-affected groundwater. Level 2 analytes are shown in Table 2 of the UIC Permit and are to be sampled at least once every two years from each POC well in accordance with the schedule described in Part II.F.4 of the UIC Permit.
Lixiviant:	Solution specifically prepared for injection into the oxide zone for the purpose of dissolving and recovering the copper from the oxide zone. Solution is also referred to as injectate solution. Lixiviant will be prepared from raffinate once the SX/EW plant begins operations; until that time, lixiviant will be prepared from groundwater.
Maximum Contaminant Level (MCL):	The maximum permissible level of a contaminant in water which is delivered to any user of a public water system. MCLs are established by the USEPA in accordance with the Safe Drinking Water Act and 40 CFR 141.
Mechanical Integrity:	Pursuant to 40 CFR 146.8, an injection well has mechanical integrity if: • Part I tests indicate there is no significant leak in the casing, tubing or packer (internal mechanical integrity); and • Part II tests indicate there is no significant fluid movement into an underground source of drinking water through vertical channels adjacent to the injection well bore (external mechanical integrity).
MODFLOW:	The United States Geologic Survey (USGS) Modular Three-Dimensional Finite Difference Groundwater Flow Model. McDonald and Harbaugh, 1988.
MT3D:	A Modular Three-Dimensional Finite Difference Chemical Transport Model. Chunmiao Zheng (Papadopulos and Associates), 1990.
Observation Well:	Well installed and/or operated for the purpose of collecting samples and/or monitoring the hydraulic head (water level) in the immediate vicinity of an injection or recovery well.
Operational Unit:	Two or more resource blocks joined to form an operating unit in which injection and recovery wells have been or will be installed and operated.
Oxide:	A mineral compound such as cuprite, rutile, or spinel $MgAl_20_4$ that is characterized by the linkage of oxygen with metallic elements.

Oxide Exclusion Zone:	The upper 40 feet of the oxide zone in which the injection of lixiviant is prohibited unless the permittee has received written approval from the USEPA to inject less than 40 feet from the top of the oxide zone (Part II.D.5 of APP and Part II.A.2 of UIC Permit).
Oxide Zone:	An area of mineral deposits modified by surface waters (e.g. sulfides altered to oxides and carbonates) such as has occurred in the upper portion of the bedrock beneath the site of the FCP.
Parameter:	A variable, measurable property whose value is a determinant of a system.
Particle Tracking:	A technique used to trace flow paths, or pathlines, by tracking the movement of infinitely small imaginary particles placed in the groundwater flow field. Particle tracking is primarily used to understand the transient movement of groundwater flow and calculate groundwater travel times.
PATH3D:	A Ground-Water Path and Travel-Time Simulator by Chunmiao Zheng (Papadopulos and Associates) 1992. A general particle tracking program for calculating groundwater paths and travel times in steady-state or transient two-or three-dimensional flow fields.
Perimeter Wells:	Wells installed along perimeter of operational unit and operated for the purpose of maintaining hydraulic control.
Plant Run-off Pond:	Lined pond located near SX/EW plant and designed to hold for short periods of time, process solutions released due to process upsets and direct precipitation that falls within the lined drainage area of the SX/EW plant.
Point of Compliance (POC):	A point or points designated by ADEQ director for identifying the point(s) at which compliance with aquifer water quality standards shall be determined. The POC shall be a vertical plane downgradient of the facility that extends through the uppermost aquifer(s) underlying the facility (A.R.S. § 49-244).
Point of Compliance Well:	Well installed at a POC for the purpose of collecting groundwater samples for compliance monitoring in accordance with requirements of the APP and UIC Permit.
Porosity:	The percentage of the bulk volume of rock or soil that is occupied by interstices, whether isolated or connected.
Porphyry:	An igneous rock of a composition that contains conspicuous phenocrysts in a fine-grained groundmass; a porphyritic igneous rock.
Porphyry Copper:	A copper deposit in which the copper-bearing minerals occur in disseminated grains and/or in veinlets through a large volume of rock. The term implies a large low-grade disseminated copper deposit which may be also in schist, silicated limestone, and volcanic rocks, with quartz-bearing igneous rocks always being in close association.
Pregnant Leach Solution (PLS):	A solution containing dissolved copper recovered from recovery wells during *in-situ* copper recovery operations for delivery to a SX/EW plant.

Public Water System: A public water system is defined (40 CFR 142.2(k)) as a system for the provision to the public of piped water for human consumption, if such system has at least 15 service connections or regularly serves an average of at least 20 individuals daily at least 60 days out of the year.

Quartz Monzonite: Granitic rock in which quartz comprise 10 percent to 20 percent of the felsic constituents, and in which the alkali feldspar/total feldspar ratio is between 35 percent and 65 percent; the approximate intrusive equivalent of rhyodacite. With an increase in plagioclase and femic minerals, it grades into granodiorite, and with more alkali feldspar, into a granite.

Raffinate: PLS from which copper has been removed in a SX/EW plant. Also referred to as "barren" PLS. Raffinate is acidified to form injectate solution (lixiviant).

Recovery Well: Well used to pump PLS to surface.

Resource Block: The smallest unit used for planning the development of operational units in the ISCR area. Each resource block occupies an area of approximately 500 x 500 feet.

Rinse Water: Water that has been injected into an IRZ, or pulled into an IRZ from the surrounding formation via recovery wells, for the purpose of rinsing constituents associated with *in-situ* solutions from the IRZ. The rinsing process is used to restore groundwater quality to levels required by the APP and the UIC Permit.

Run-Off Water: Water from rain or snow that runs off of land, including areas in which facilities are located.

Run-On Water: Run-on water refers to water that would run onto areas of interest (e.g., where facilities are located) unless the areas were protected by berms or similar devices that direct the water around the area of interest.

Solvent Extraction and Electowinning (SX/EW): A two-stage process that first extracts and upgrades copper ions from low-grade leach solutions into a concentrated electrolyte, and then deposits pure copper onto cathodes using an electrolytic procedure.

Stacking: Refers to process of increasing the copper content in PLS to economically recoverable levels by re-injecting PLS into the IRZ from which the PLS was produced or into another IRZ.

Substances, Hazardous: Means:

- Any substance designated pursuant to §§ 311(b)(2)(a) and 307(a) of the Clean Water Act.
- Any element, compound, mixture, solution or substance designated pursuant to § 102 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).
- Any hazardous waste having the characteristics identified under or listed pursuant to § 49-922.
- Any hazardous air pollutant listed under § 112 of the Federal Clean Air Act (42 United States Code [U.S.C.] § 7412).
- Any imminently hazardous chemical substance or mixture with respect to which the administrator has taken action pursuant to § 7 of the Federal Toxic Substances Control Act (15 U.S.C. § 2606).
- Any substance which the director of the ADEQ, by rule, designates as a hazardous substance.

Sulfides:	Mineral compounds such as galena, PbS, or pyrite, FeS_2, characterized by the linkage of sulfur with a metal or semi-metal
Sulfide Zone:	An area of enrichment of sulfide deposits that have not yet been oxidized by near-surface waters.
Supergene:	A mineral deposit or enrichment formed by descending solutions; also, refers to those solutions of that environment.
Surface Impoundment:	A pit, pond or lagoon, having a surface dimension that is equal to or greater than its depth, which is used for the storage, holding, settling, treatment or discharge of liquid pollutants or pollutants containing free liquids.
Storativity/Specific Yield:	Storativity and specific yield are related parameters. Storativity is defined as the amount of water released or added to storage per change in pressure due to pumping or recharge in a confined aquifer. Specific yield is the percentage of water that would drain from a unit volume of aquifer material (i.e., 1 cubic foot) in an unconfined aquifer. For coarse sands and gravel, the specific yield is roughly equal to the porosity. Storativity and specific yield control the time it will take for changes in pumping or recharge to propagate throughout an aquifer system.
Temporary Cessation:	Any cessation of operation of a facility for a period of greater than 60 days but which is not intended to be permanent (A.A.C. R18-9-A209.A.1).
Transmissivity:	In an aquifer, the rate at which water of the prevailing kinematic viscosity is transmitted through a unit width under a unit hydraulic gradient. Though spoken of as a property of the aquifer, it embodies also the saturated thickness and the properties of the contained liquid.
Underground Source of Drinking Water (USDW):	Defined at 40 CFR 144.3 as an aquifer or its portion which: 1. supplies any public water system; or 2. contains sufficient quantity of groundwater to supply a public water system; and (i) currently supplies drinking water for human consumption; or (ii) contains fewer than 10,000 milligrams per liter (mg/L) total dissolved solids (TDS); and 3. is not an exempted aquifer.
Underground Injection Control (UIC):	Pertains to injection-related activities subject to Part C of Safe Drinking Water Act.
Underground Injection Control Permit No. AZ396000001 (UIC Permit):	UIC Permit issued by USEPA on May 1, 1997 authorizing the construction and operation of injection and recovery wells for the purpose of *in-situ* copper recovery at FCP site.
Vadose Zone:	A subsurface zone containing water under pressure less than that of the atmosphere, including water held by capillarity; and containing air or gases generally under atmospheric pressure. This zone is limited above by the land surface and below by the surface of the zone of saturation, i.e. the water table.

Water Impoundment: The existing impoundment plus six proposed impoundments at the FCP that will receive neutralized ISCR solutions and associated sediments.

Well Field: Refers to the surface and subsurface area within an operational unit or resource block in which injection and recovery wells are, will be, or have been operating.

Zone of Endangering Influence (ZEI): Term used in one of two methods recognized in 40 CFR 146.6 for determining area of review around a well or project area. The ZEI is the lateral distance from the point of injection in which the pressures in the injection zone may cause the migration of injected or formation solutions into an underground source of drinking water.

Zone of Saturation: A subsurface zone in which all the interstices are filled with water under pressure greater than that of the atmosphere. Although the zone may contain gas-filled interstices or interstices filled with fluids other than water, it is still considered saturated. This zone is separated from the zone of aeration by the water table.

Acronyms and Abbreviations

1996 Application	The Aquifer Protection Program Permit application submitted by BHP Copper Inc. to the Arizona Department of Environmental Quality in January 1996
A.A.C.	Arizona Administrative Code
A.R.S.	Arizona Revised Statutes
ACD	annular conductivity device
ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
AL	alert level
amsl	above mean sea level
AOR	Area of Review
APP	Aquifer Protection Permit
AQL	aquifer quality limit
ASMI	Arizona State Mine Inspector
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
AWQS	aquifer water quality standard
BADCT	best available demonstrated control technology
bgs	below ground surface
BHP Copper	BHP Copper Inc.
CAP	Central Arizona Project
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
Conoco	Continental Oil Company
Curis Arizona	Curis Resources (Arizona) Inc.
Florence Copper	Florence Copper Inc.
FRP	fiberglass reinforced plastic
FCP	Florence Copper Project
GHB	general head boundary
GIS	geographic information system
gpd	gallons per day
gpd/ft	gallons per day per foot
gpm/ft	gallons per minute per foot
GPL	groundwater protection level
gpm	gallons per minute
HCS	hydraulic control solution
HDI	Hunter Dickinson Inc.
HDPE	high density polyethylene

IRZ	injection and recovery zone
ISCR	*In-Situ* Copper Recovery
LBFU	Lower Basin Fill Unit
LCRS	leak collection and removal system
LCU	Lower Conglomerate Unit
Magma	Magma Copper Company
MCL	maximum contaminant level
MFGU	Middle Fine-Grained Unit
mg/L	milligrams per liter
MSCU	Middle Silt and Clay Unit
MSDS	Material Safety Data Sheet
NAICS	North American Industry Classification System
pCi/L	pico Curies per liter
PLS	pregnant leach solution
PMA	pollutant management area
POC	point of compliance
PQL	practical quantitation limit
psi/ft	pounds per square inch per foot
PTF	Production Test Facility
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
SARA	Superfund Amendments and Reauthorization Act
SCIDD	San Carlos Irrigation and Drainage District
SCIP	San Carlos Irrigation Project
SIC	Standard Industrial Classification
SPCC	Spill Prevention, Control, and Countermeasure
SRL	soil remediation level
SWPPP	Storm Water Pollution Prevention Plan
SWS	Schlumberger Water Services
SX/EW	solvent extraction/electrowinning
TDS	total dissolved solids
TPH	total petroleum hydrocarbon
UAU	Upper Alluvial Unit
UBFU	Upper Basin Fill Unit
UIC	Underground Injection Control
UIC Permit	UIC Permit No. AZ39600001
USDW	Underground Source of Drinking Water

USEPA	United States Environmental Protection Agency
USF	Underground Storage Facility
WCAP	Well and Corehole Abandonment Plan
ZEI	Zone of Endangering Influence

CURIS RESOURCES (ARIZONA) INC.

APPLICATION TO AMEND UIC PERMIT NO. AZ396000001

ATTACHMENT A – AREA OF REVIEW

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A.1. Introduction

This Attachment A has been prepared in support of an application (Application) by Curis Resources (Arizona) Inc. (Curis Arizona) to the United States Environmental Protection Agency (USEPA) to transfer, with amendments, Underground Injection Control Class III (Area) Permit No. AZ396000001 (UIC Permit) from Florence Copper Inc. (Florence Copper) to Curis Arizona. USEPA originally issued the UIC Permit to BHP Copper Inc. (BHP Copper) on May 1, 1997, authorizing BHP Copper to operate an *in-situ* copper recovery (ISCR) facility on property owned by BHP Copper (Site), identifying a permitted ISCR area (designated the "mine area" in the UIC Permit) on which ISCR operations were authorized to take place, and granting an aquifer exemption for this purpose. The Site was subsequently sold and the UIC Permit was transferred from BHP Copper to Florence Copper in December 2001.

The proposed Florence Copper Project (FCP or Facility), is located on the same Site for which USEPA issued the UIC Permit to BHP Copper. The Site is located approximately 2 miles northwest of the business district of Florence, Arizona. Curis Arizona's proposed ISCR operations will be constructed within an area approximately 212 acres in size, located within the Site boundary and on property owned by Curis Arizona and leased by Curis Arizona as Arizona State Mineral Lease No. 11-26500. The proposed Facility will be constructed on portions of Sections 26, 27, 28, 33, 34, and 35 of Township 4 South, Range 9 East, of the Gila River Baseline and Meridian.

The UIC Permit describes an Area of Review (AOR) that extends 500 feet beyond the permitted ISCR area. This area coincides with the area for which USEPA granted the aquifer exemption in 1997. This Attachment A describes work completed to determine the AOR, as per requirements in 40 Code of Federal Regulations (CFR) 146.6. The work involved evaluating BHP Copper's justification of the AOR as submitted to USEPA in the UIC Permit application and generating a new computer model to calculate an updated AOR.

The updated model indicates an AOR boundary that is significantly less than 500 feet beyond the ISCR area; however, Curis Arizona does not propose to change either the AOR or the aquifer exemption area. For the planned ISCR facility, Curis Arizona proposes an AOR and aquifer exemption boundary equal to those permitted under the UIC Permit. In this attachment, Curis Arizona provides justification for an AOR that is equal to the area of the proposed ISCR area and a circumscribing width of 500 feet.

The proposed ISCR area, aquifer exemption boundary, and AOR are shown on Figure A-1.

A.2. Background

In 1997 and 1998, BHP Copper conducted a hydraulic control test as was required by Aquifer Protection Permit No. 101704 (APP), issued by the Arizona Department of Environmental Quality (ADEQ) to BHP Copper in conjunction with USEPA's issuance of the UIC Permit. This test was conducted to demonstrate that hydraulic control could be maintained within the portion of the oxide zone, where process solutions were being injected and recovered. The oxide zone is the upper portion of the bedrock underlying the Site in which soluble copper is located. The test successfully demonstrated that hydraulic control could be maintained. The successful completion of the test was reported to ADEQ in a letter, dated April 6, 1998 (BHP Copper, 1998). Although fully permitted by ADEQ and the USEPA to conduct full-scale commercial copper production by ISCR methods, BHP Copper deferred constructing the full-scale facility required for this purpose, and later sold the property to Florence Copper.

A.2.1 Hydraulic Control

Curis Arizona's proposed ISCR system includes injection wells and recovery wells that are constructed in accordance with USEPA's Underground Injection Control Program Class III well standards and designed specifically for the purpose of mineral production. The injection and recovery wells will be surrounded by an additional ring of "perimeter" wells, also constructed to Class III well standards, installed for the purpose of

maintaining hydraulic control, and a ring of observation wells constructed outside of the outermost ring of recovery/perimeter wells for the purpose of documenting hydraulic control. Within this system, the proposed Class III injection wells will be surrounded by recovery wells that will recover a volume of fluid that exceeds the volume injected to ensure that an inward hydraulic gradient is maintained and that injected process fluids are recovered.

Because the Class III injection wells will be directly paired with recovery wells that will recover more fluid than is injected, the net hydraulic effect of the proposed Class III injection and recovery well array will be a groundwater gradient that slopes inward, toward the ISCR facility from all sides. The inward sloping hydraulic gradient will be of a magnitude sufficient to overcome the natural groundwater gradient, preventing injected solutions from escaping the ISCR area, thereby establishing hydraulic control.

Hydraulic control serves a twofold purpose: it is a UIC Permit requirement (Part II.B.2 – Aquifer Exemption) that is intended to prevent the loss of injected solution to underground sources of drinking water (USDWs); and it is a fundamental business requirement of the proposed copper recovery method. The BHP Copper test demonstrated that hydraulic control (and permit compliance) could be achieved. From a business perspective, the injected solutions represent a capital investment arising from both the generation of the solution and the energy required to inject it. Without hydraulic control, a substantial investment is put at risk by partial or failed recovery. Consequently, under normal operating conditions, there is no incentive to continue injection if loss of hydraulic control has occurred. Both regulatory and economic incentives dictate that if hydraulic control has been lost, injection will cease immediately and work will commence immediately to recover injected solutions and re-establish hydraulic control.

Under normal operating conditions of the proposed ISCR, injection and recovery rates and the resultant pressure effects will be balanced such that the operator can be certain of recovering the injected solutions with sufficient additional formation water as necessary, to maintain an inward hydraulic gradient and hydraulic control. Balancing the injection and recovery rates has the effect of limiting the extent of the pressure influence generated by injection to the area within the outermost ring of recovery wells, and eliminating pressure effects outside of the active ISCR area that have the potential to cause the migration of injected fluids or formation fluids into a USDW. Formation fluids present in the vicinity of the FCP Site consist of groundwater of a quality generally suitable for agricultural and industrial uses, and in some cases drinking water.

The nearest USDW to the proposed ISCR facility is defined as beyond the aquifer exemption area, which extends 500 feet horizontally beyond the ISCR area and above the Middle Fine-Grained Unit (MFGU), a locally extensive aquitard.

A.2.2 Area of Review

The distance between the point of injection and the outer boundary of the AOR is defined in 40 CFR 146.6 as either a fixed radius of ¼ mile or a linear distance described as the "zone of endangering influence" (ZEI). The ZEI is the lateral distance from the point of injection in which the pressures in the injection zone may cause the migration of injected solutions or formation fluid into a USDW. The distance of the ZEI is a calculated value.

The method for calculating the ZEI given in 40 CFR 146.6 is a mathematical model, one version of which is the Theis (1935) equation; however, other mathematical models are permitted. Because the proposed Class III injection and recovery well array will maintain an inward hydraulic gradient throughout operations, the calculation method defined in 40 CFR 146.6 results in a ZEI radius that does not extend beyond the edge of Curis Arizona's proposed outer recovery well ring under normal operating conditions.

For this reason, Curis Arizona proposes a radial distance for the AOR that is based on the distance that injected solutions may migrate as a result of pressure generated during the maximum permissible excursion. The maximum permissible excursion is defined in Part II.H.1.b - Contingency Plans, of the UIC Permit. This Part requires that injection cease within 48 hours of the loss of hydraulic control, while pumping at recovery and perimeter wells continues in an effort to re-establish hydraulic control. As described above, there are

neither operational nor economic incentives to continue injection once loss of hydraulic control has been detected. Consequently, Curis Arizona has no intention of continuing injection after loss of hydraulic control; however, the 48-hour period cited in the UIC Permit was used as the basis for calculating how far injected fluids may travel under a worst case scenario.

Consistent with the maximum permissible excursion described in Part II.H.1.b of the UIC Permit, the ZEI calculation assumes that injection continues during the entire 48-hour excursion period. The ZEI calculation was performed using the average injection rate of 55 gallons per minute proposed by Curis Arizona for the FCP, for a period of 48 hours, with no hydraulic control, and assuming average hydraulic characteristics of the oxide zone. This calculation effectively generates an AOR that includes both the immediate area chemically affected by injected solutions under normal operating conditions and a larger area potentially chemically affected by excursion of injected solutions.

Beyond the larger chemically affected area, pressure effects generated by injection during the maximum permissible excursion period will only serve to drive formation fluid (clean groundwater) away from the site of injection for a period of 48 hours until hydraulic control is resumed.

A.3. Method of AOR Calculation

As defined in 40 CFR 146.6, the AOR may be calculated using the Theis (1935) equation, or other mathematical model, which calculates the radial distance of injection impacts emanating from a single injection well. The Theis equation is a mathematical function designed to represent transient well impacts in a confined aquifer system, and is limited to a radial, or two-dimensional (2-D), representation of groundwater conditions. The Theis method has limited application when considering the impact of injection within a multi-layer, confined to semi-confined aquifer system such as occurs at the FCP Site.

For these reasons, Curis Arizona has chosen a different mathematical model that is more appropriate for site conditions and which represents industry standard methods for the calculation of groundwater flow. The selected method consists of a combination of MODFLOW (Harbaugh, et. al., 2000), a three-dimensional (3-D) groundwater flow model, and MT3D (Zheng, 1990), a 3-D solute transport model. Combined, these two modeling tools can be used to predict how far injected solutions may travel during the maximum permissible excursion.

Although MODFLOW and the Theis equation employ different mathematical methodologies to estimate the flow of groundwater and impacts to water levels attributable to pumping or injection, they are both based upon the same fundamental flow equation describing hydraulic head in a confined aquifer system. Due to the common basis for both MODFLOW and the Theis equation, either method will produce essentially identical results provided that the inherent and applied assumptions for each method are consistent. Given the relatively complex hydrogeologic setting at the FCP Site, the MODFLOW code coupled with the MT3D solute fate and transport code were selected to estimate the linear extent of migration of injected fluids during the maximum permissible excursion at the FCP Site.

A.3.1 MODFLOW Groundwater Flow Equation

The MODFLOW code is a computer based, finite difference mathematical model designed for the purpose of calculating 3-D groundwater pumping and injection impacts in various types of aquifers. The finite-difference technique essentially solves for hydraulic head by discretizing the flow domain into a computational grid composed of orthogonal blocks, with a node located at the center of each block. In general, the finite-difference approximation assumes that all hydraulic parameters, stresses, and inputs are constant over the area of a single cell and over the time elapsed during a stress period. Likewise, calculated hydraulic head and groundwater fluxes are also averaged over the areal extent of a single cell. Using the model for a specific application requires the definition of boundary and initial conditions, estimates of key hydraulic parameters, and definitions of groundwater inflows and outflows as a function of time.

The governing equation for MODFLOW is presented below. It is the partial-differential equation of groundwater flow as given in McDonald and Harbaugh (1988):

$$\frac{\partial}{\partial x}\left(Kxx\frac{\partial h}{\partial x}\right)+\frac{\partial}{\partial y}\left(Kyy\frac{\partial h}{\partial y}\right)+\frac{\partial}{\partial z}\left(Kzz\frac{\partial h}{\partial z}\right)+W=S_S\frac{\partial h}{\partial t} \qquad (1)$$

Where,

- Kxx, Kyy, and Kzz are values of hydraulic conductivity along the x, y, and z coordinate axes, respectively, which are assumed to be parallel to the major axes of hydraulic conductivity (Length/Time);
- h is the potentiometric head (Length);
- W is a volumetric flux per unit volume representing sources and/or sinks of water, with W<0.0 for flow out of the ground-water system, and W>0.0 for flow in (Time $^{-1}$);
- S_S is the specific storage of the porous material (Length^{-1}); and
- t is Time.

Equation 1, when combined with boundary and initial conditions, describes transient 3-D groundwater flow in a heterogeneous and anisotropic medium, provided that the principal axes of hydraulic conductivity are aligned with the coordinate directions.

Note that the hydraulic conductivity values represented in Equation 1 reflect the primary, 3-D flow directions for a finite difference model. Essentially, the "x" and "y" dimensions represent flow in the plan view, and are analogous to the dimensions of results from the Theis equation. The "z" dimension represents vertical groundwater flow and potential hydraulic impacts.

A.3.2 MODFLOW/MT3D Groundwater Model

A MODFLOW groundwater flow model, representing geologic conditions observed and hydraulic properties measured at the FCP Site, was used to simulate a worst case scenario reflecting continued injection of solutions at 55 gallons per minute at a single well over the maximum permissible excursion period of 48 hours.

The MODFLOW model was constructed using hydrostratigraphic unit thicknesses and hydraulic parameters measured during studies conducted at the FCP Site which are described in Attachment I of this Application. The model construction included three layers representing the Lower Basin Fill Unit (LBFU) that immediately overlies the bedrock under the ISCR area, the uppermost 40 feet of the Oxide Bedrock Zone, and a thickness of the remaining Oxide Bedrock Zone that is representative of the average thickness.

In the MODFLOW model, the LBFU was allowed to be in hydraulic communication with the underlying Oxide Bedrock Zone, but was confined by the overlying MFGU. In accordance with requirements of the UIC Permit that are imposed to inhibit vertical excursion of injected fluids into the LBFU, the MODLFOW model excluded the uppermost 40 feet of the Oxide Bedrock Zone from injection.

The MODLFOW model generated a 3-D flow field that was imported into MT3D. MT3D was then used to model the advective and dispersive transport of the injected solution, at the rate and time period given. Modeling advective and dispersive transport of injected solutions results in a more conservative estimate of the ZEI radius than does modeling fluid migration using the Theis method, because advection and dispersion have the potential to allow dissolved constituents in the injected fluid to move further than would be calculated using the Theis method.

Groundwater flow and transport scenarios were run using an array of porosity and hydraulic conductivity values representative of Site conditions to determine approximate maximum and minimum transport distances of injected fluids. Porosity values ranged between 2 and 10 percent, and hydraulic conductivity values ranged between 0.2 and 2.5 feet per day. Results of the MODFLOW/MT3D simulations are described below.

A.3.3 MODFLOW/MT3D Simulation Results

Using hydraulic properties and hydrostratigraphic unit thicknesses representative of FCP Site conditions, simulations conducted using the MODFLOW/MT3D model described above resulted in radial injectate migration distances that ranged between approximately 90 and 140 feet from the simulated injection well.

A.4. Proposed AOR

Curis Arizona proposes an AOR that is equivalent to the ISCR area and a circumscribing width of 500 feet. This AOR is conservative with respect to protecting USDWs because it provides a factor of safety of between 3.5 and 5 times the actual distance that injectate may migrate under worst-case conditions associated with the maximum permissible excursion described in the UIC Permit at the average injection rate proposed by Curis Arizona for the FCP.

The proposed AOR is shown on Figure A-1 together with the planned ISCR area, Curis Arizona property boundary, and other pertinent features.

A.5. References

BHP Copper Inc., 1998. Correspondence, Letter to Julie Collins, ADEQ Compliance Officer, From Corolla Hoag, BHP Copper, *Report of Results of Hydraulic Control Test*.

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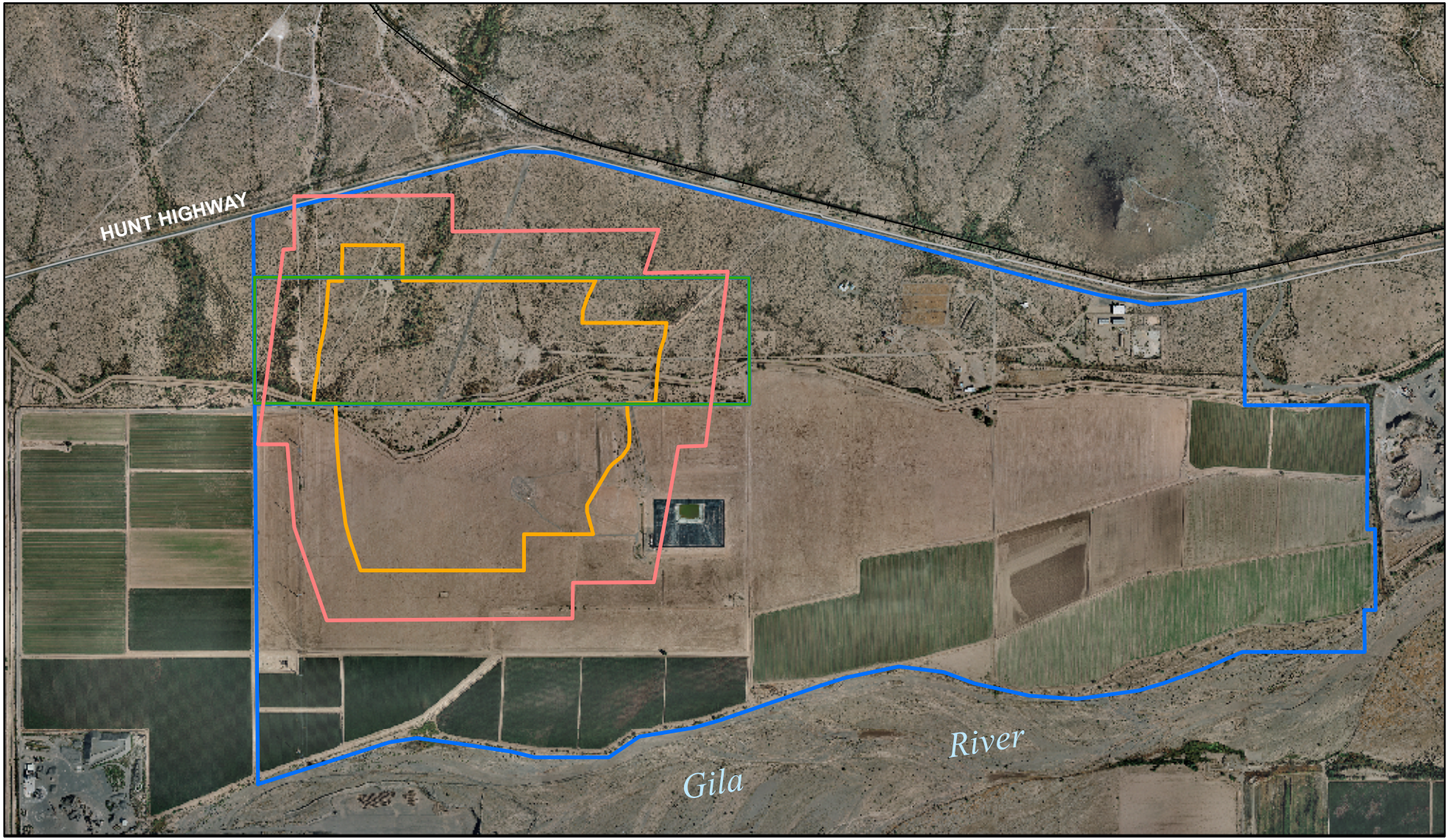

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SCALE IN FEET

EXPLANATION

- AREA OF REVIEW
- ISCR AREA
- CURIS PROPERTY BOUNDARY
- STATE MINERAL LEASE BOUNDARY

Figure A-1
AREA OF REVIEW
CURIS RESOURCES (ARIZONA) INC.
FLORENCE, ARIZONA

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CURIS RESOURCES (ARIZONA) INC.

APPLICATION TO AMEND UIC PERMIT NO. AZ396000001

ATTACHMENT B – MAP OF AREA

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B.1 Introduction

This Attachment B has been prepared in support of an application by Curis Resources (Arizona) Inc. (Curis Arizona) to the United States Environmental Protection Agency (USEPA) to transfer, with amendments, Underground Injection Control Class III (Area) Permit No. AZ396000001 (UIC Permit) from Florence Copper Inc. (Florence Copper) to Curis Arizona.

Curis Arizona is proposing to develop an *in-situ* copper recovery (ISCR) facility, referred to as the Florence Copper Project (FCP). The FCP will produce copper from a porphyry copper oxide deposit (oxide zone) located under the FCP site. USEPA originally issued the UIC Permit to BHP Copper Inc. (BHP Copper) to operate a similar facility on the same site. The FCP facility proposed by Curis Arizona consists of injection and recovery wells, a process plant, several water storage structures, tanks, piping, water treatment facilities, and associated control rooms, warehouses, administrative buildings, and other infrastructure. The proposed ISCR area will be constructed within an area approximately 212 acres in size that is located within property owned by Curis Arizona and an Arizona State Mineral Lease held by Curis Arizona.

The injection wells will be used to inject a dilute sulfuric-acid solution (injectate solution or lixiviant) into the oxide zone to dissolve copper-bearing minerals, liberating copper into solution. The resulting copper-laden pregnant leach solution (PLS) will be pumped back to the surface by the recovery wells. Copper will be stripped from the PLS by means of a solvent extraction/electrowinning (SX/EW) process. Once copper has been recovered from the PLS, the chemistry of the "barren" PLS (raffinate) will be adjusted and will be re-injected back into the oxide zone as lixiviant for further copper dissolution. Using this closed-loop system, the majority of the process solutions will be recycled. A small amount of make-up water, an associated raffinate-bleed needed to adjust raffinate chemistry, and a relatively small stream of groundwater pumped to maintain hydraulic control will be discharged to on-site water impoundments.

This Attachment B includes a site plan that extends one mile beyond the Curis Arizona property boundary, and that depicts key features of the proposed FCP and the surrounding area as required for Attachment B under USEPA Form 7520-6. Features depicted on the map include:

- Topography;
- Project area consisting of the Curis Arizona property and Arizona State Mineral Lease No. 11-26500;
- ISCR area and the associated Area of Review (AOR);
- The proposed SX/EW plant process area and related process facilities and ponds;
- One existing and six proposed water impoundments;
- Point of compliance (POC) wells installed by BHP Copper for monitoring groundwater quality;
- Currently producing water wells within the AOR;
- Class III wells within the AOR that were installed by BHP Copper in 1997 to operate a pilot-scale test;
- Geotechnical borings and exploration coreholes within the AOR;
- Subsurface mines constructed by a previous owner, Continental Oil Company (Conoco), within the AOR;
- Residences, offices, and other buildings on and near to the property (there are no buildings currently located within the AOR);
- Major geologic faults within the AOR;
- Roads within the AOR and surrounding areas; and
- Wells within ¼ mile of the Curis Arizona property boundary.

Certain features required to be shown on a map, according to the instructions for Attachment B of USEPA Form 7520-6, do not occur within the project area or within one mile of the project area as described below.

The nearest public water supply systems are located more than one mile to the east and southeast of the Curis Arizona property boundary, upgradient from the FCP site and near to the town of Florence. Other public water supply systems are located more than two miles west and north of the Curis Arizona property boundary.

No hazardous waste treatment, storage, or disposal facilities exist at the FCP site or within one mile of the AOR. No abandoned wells, drywells, springs, quarries, drinking water wells, or public water supply wells exist within the one-mile radius. There are two aggregate mines, one on the east property boundary and one to the southwest of the property, that are within the one-mile radius.

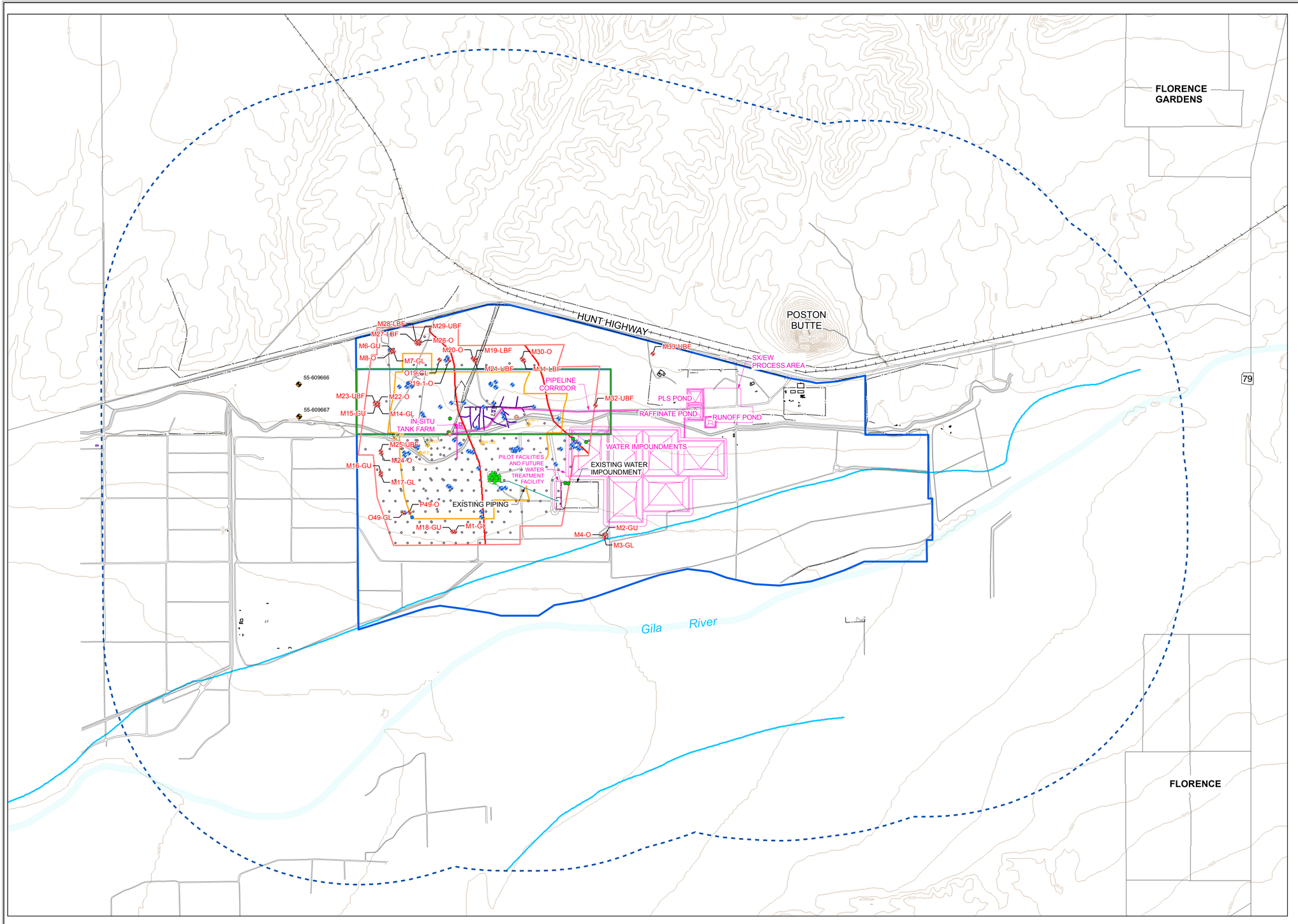

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Figure B-1
SITE PLAN
CURIS RESOURCES (ARIZONA) INC.
FLORENCE, ARIZONA

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CURIS RESOURCES (ARIZONA) INC.

APPLICATION TO AMEND UIC PERMIT NO. AZ396000001

ATTACHMENT C – CORRECTIVE ACTION PLAN & WELL DATA

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C.1 Introduction

This Attachment C has been prepared in support of an application (Application) by Curis Resources (Arizona) Inc. (Curis Arizona) to the United States Environmental Protection Agency (USEPA) to transfer, with amendments, Underground Injection Control Class III (Area) Permit No. AZ396000001 (UIC Permit) from Florence Copper Inc. (Florence Copper) to Curis Arizona. This attachment includes a tabulation of data available from public sources of all wells within the Area of Review (AOR) described in Attachment A of this Application, and identifies all wells and coreholes within the AOR that are improperly sealed or abandoned.

C.2 Well Data

This Attachment includes data from public sources and from previous owners of the FCP site that describe:

- Class III wells within the AOR (Table C-1)
- All non-Class III wells within the AOR (Table C-2); and
- Coreholes which penetrate the proposed injection zone within the AOR (Table C-3).

Wells within the AOR include Point of Compliance (POC) wells, formation testing and monitoring wells, industrial wells, irrigation wells, exploration coreholes, and Class III wells constructed by previous owners of the Florence Copper Project (FCP) site (Site). All but two of those wells are owned by Curis Arizona. The two wells not owned by Curis Arizona are irrigation wells identified as BIA 9 and BIA 10B in Table C-2. Curis Arizona plans to relocate these wells prior to commencement of commercial *in-situ* copper recovery (ISCR) operations at the Site.

The existing Class III wells at the Site (Table C-1) were constructed by a previous owner of the FCP in accordance with requirements established by the UIC Permit. The existing Class III wells are deemed to have been properly sealed and may be used during Curis Arizona's operations, as required.

Non-Class III wells within the AOR (Table C-2) have generally been constructed in accordance with Arizona Department of Water Resources (ADWR) well construction standards, but not to Class III standards. These wells will be properly plugged and abandoned prior to commencement of ISCR operations within 500 feet of these wells, with the exception of POC wells and other monitoring wells.

Three hundred and forty coreholes exist within the ISCR area and the AOR (Table C-3). The coreholes were drilled as exploratory borings and have not been sealed in accordance with ADWR or Class III well construction standards, and are not considered to be properly sealed. Each of the coreholes will be properly plugged and abandoned prior to commencement of ISCR operations within 500 feet of a corehole location.

C.3 Corrective Action

Corrective action will be taken to prevent the migration of injected fluids between or into underground sources of drinking water (USDWs) within the AOR. Corrective action includes plugging and abandonment of all wells and coreholes within the AOR, with the exception of monitoring, POC, and Class III wells, prior to placing an injection well into operation within 500 feet of the well. The wells and coreholes will be plugged and abandoned in accordance with the Plugging and Abandonment Plan provided in Attachment Q of this Application.

Table C-1. Exisitng Class III Wells Within the Proposed Area of Review

Well ID	Well Type	Location/ADWR No.	Location Coordinates (Northing Easting)	Total Depth (feet)[a]	Casing Diameter	Screened Interval (feet)[a]
BHP-1	Test	D(4-9)28dcc	744922.9N, 649371.5E	830	5"	403-800
BHP-2	Test	D(4-9)28dcc	744873.4N, 649423.3E	894	5"	408-770
BHP-3	Test	D(4-9)28dcc	744975.7N, 649419.5E	872	5"	403-860
BHP-4	Test	D(4-9)28dcc	744975.9N, 649320.3E	834	5"	403-742
BHP-5	Test	D(4-9)28dcc	744877.1N, 649321.9E	798	5"	403-776
BHP-6	Test	D(4-9)28dcc	744923.1N, 649420.2E	820	5"	410-805
BHP-7	Test	D(4-9)28dcc	744974.0N, 649371.9E	810	5"	410-760
BHP-8	Test	D(4-9)28dcc	744923.6N, 649320.8E	790	5"	410-790
BHP-9	Test	D(4-9)28dcc	744874.3N, 649370.2E	850	5"	410-840
BHP-10	Test	D(4-9)28dcc	744923.1N, 649471.2E	840	5"	400-820
BHP-11	Test	D(4-9)28dcc	745026.3N, 649370.5E	805	5"	400-805
BHP-12	Test	D(4-9)28dcc	744922.9N, 649270.6E	770	5"	400-770
BHP-13	Test	D(4-9)28dcc	744824.0N, 649370.6E	840	5"	420-826
OWB-1	Observation	D(4-9)28dcc	744975.9N, 649470.8E	830	5"	420-795
OWB-2	Observation	D(4-9)28dcc	745026.2N, 649321.1E	225	5"	200-220
OWB-3	Observation	D(4-9)28dcc	744976.4N, 649270.5E	820	5"	420-796
OWB-4	Observation	D(4-9)28dcc	744873.6N, 649270.3E	755	5"	410-745
OWB-5	Observation	D(4-9)28dcc	744873.9N, 649470.9E	765	5"	420-765
OWB-6	Observation	D(4-9)28dcc	745134.0N, 649160.0E	925	5"	420-920
CH1	Observation	D(4-9)28dcc	744935.0N, 649381.9E	789	5"	420-520, 560-660, 700-780
CH2	Observation	D(4-9)28dcc	744934.0N, 649407.9E	775	5"	420-520, 560-660, 700-760

[a] *Feet below ground surface (bgs)*

Table C-2. Summary of Information for all Non-Class III Wells in the Area of Review

Well ID*	Well Type	Location/ ADWR No.**	Location Coordinates (Northing Easting)	Land Elevation (feet)[a]	Reference Point Elevation (feet)[a]	Total Depth (feet)[b]	Casing Diameter, Depth (inches; feet bgs)	Screened Interval (feet)[b]	Top of Bedrock (feet)[b]	Date Installed	Well Owner	Condition/Remarks
MF2 (MF-Y)	Irrigation	D(4-9)28cdb 55-627641 aka: D(4-9)28cdbc D(4-9)28cdb1	745425.0N 647830.0E	1474.2	1477.1	520	20"	NA	NA	1961	NA	Discharge rate in 1971 was 1,225 gpm. 2.85-foot stickup of 5.7-inch steel casing.
PW-1 (Conoco 1, WW-1)	Industrial	D(4-9)28dbd 55-627606 aka: D(4-9)dbd2	746030.0N 650070.0E	1467.8	1467.8	949	18"; 0-540 14"; 540-937	243-947	340	12/2/74	Curis Resources (Arizona) Inc.	18-inch steel surface casing from 0 to 538 feet. 14-inch steel casing from 0 to 949 feet. Production rate was 450 gpm in 1976.
PW-2 (Conoco 2)	Industrial	D(4-9)28cab 55-627607 aka: D(4-9)28cabb D(4-9)28bdc	747070.0N 647940.0E	1483.17	1483.57	981	18"; 0-621 14"; 621-981	234-981	580	1/29/75	Curis Arizona	18-inch steel surface casing 0 to 621 feet. 14-inch steel casing from 0 to 981 feet. Production rate was 1,600 gpm in 1976.
PW-3 (Conoco 3, WW-3)	Irrigation	D(4-9)28cdb 55-627608 aka: D(4-9)28cdbb D(4-9)28cdb2	745490.0N 647950.0E	1470	1470	938	18"; 0-496 14"; 496-936	240-933	372	11/21/74	Curis Arizona	18-inch surface casing from 0 to 496 feet. 14-inch casing from 496 to 933 feet. Production rate was 1,500 gpm in 1976. Previously Conoco 3.
OB-1 (OW-1, OBS-1, OB-1 Conoco)	Monitor	D(4-9)28cda aka: D(4-9)28cda3	745613.8N 648660.9E	1472.12	1472.12	1496	5"; 0-1,035	470-1,035	455	1972	Curis Arizona	10⅝-inch steel surface casing from 0 to 68 feet. 8⅝-inch blank steel casing from 0 to 47 feet. 5½-inch steel casing perforated from 470 to 1,035 feet. Cement plug set at 1,035 feet.
OB-2 (OW-2, OB-2 Conoco)	Monitor	D(4-9)28cad aka: D(4-9)28cad1	745947.9N 649003.9E	1473.47	1473.47	1600	8"; 0-295 5"; 295-1,030	285-1,030	368.5	1972	Curis Arizona	13⅜-inch blank steel surface casing from 0 to 51 feet. 8⅝-inch blank steel casing from 0 to 295 feet. 5½-inch casing perforated from 285 to 1,030 feet. Cement plug set at 1,030 feet.
OB-3 (McFarland 1, OW-3, Mf H20, MFZ)	Irrigation	D(4-9)28cda 55-627640 aka: D(4-9)28cda1 D(4-9)28cdab	745695.0N 648536.0E	NA	NA	560	20"; 0-260 16"; 260-560	75-560	NA	7/6/63	Curis Arizona	Unused
OB-4	Monitor	D(4-9)28ddb	745194.7N 650636.2E	1463	NA	350	3"	160-340	346	NA	Curis Arizona	Unable to locate
OB-5	Monitor	D(4-9)28cda	745115.2N 649038.1E	1463	NA	350	3"	160-340	NA	NA	Curis Arizona	Unable to locate

Table C-2. Summary of Information for all Non-Class III Wells in the Area of Review

Well ID*	Well Type	Location/ ADWR No.**	Location Coordinates (Northing Easting)	Land Elevation (feet)[a]	Reference Point Elevation (feet)[a]	Total Depth (feet)[b]	Casing Diameter, Depth (inches; feet bgs)	Screened Interval (feet)[b]	Top of Bedrock (feet)[b]	Date Installed	Well Owner	Condition/Remarks
OB-6	Monitor	D(4-9)28cad	746483.0N 648549.7N	1470.52	1472.3	350	4"	UNK	NA	NA	Curis Arizona	Aquifer test conducted 2/7/94 to 2/14/94. Pumped from PW-1.
OB1-1	Monitor	D(4-9)28caa	746428.3N 648750.1E	1476.48	NA	760	4"	360-740	360	1994	Curis Arizona	Aquifer test conducted 2/7/94 to 2/14/94.
OB2-1	Monitor	D(4-9)28dbc aka: D(4-9)28dbd	746157.9N 649563.9E	1471.56	NA	640	4"	400-620	340	1994	Curis Arizona	Aquifer test conducted 3/8/94 to 3/21/94.
OB2-2	Monitor	D(4-9)28dcb	745500.7N 649879.1E	1464.02	NA	800	4"	460-760	360	1994	Curis Arizona	Pump test conducted 4/20/94 to 5/2/94.
OB3-1	Monitor	D(4-9)28cbb	746204.0N 647890.2E	1475.78	NA	800	4"	500-780	430	1994	Curis Arizona	Aquifer test conducted 3/24/94 to 3/31/94.
OB4-1	Monitor	D(4-9)28cca	745584.3N 647783.0E	1471.78	NA	800	4"	440-780	380	1994	Curis Arizona	Aquifer test conducted 5/19/94 to 5/31/94.
OB7-1	Monitor	D(4-9)28cda	745455.6N 648872.2E	1468.27	NA	900	4"	540-880	370	1994	Curis Arizona	
PW1-1	Test	D(4-9)28caa	746476.5N 648742.2E	1477	1477	760	6"	360-740	360	1994	Curis Arizona	Aquifer test conducted 2/7/94 to 2/14/94.
PW2-1	Test	D(4-9)28dbc aka: D(4-9)28dbd	746199.1N 649536.1E	1471	1471.9	640	6"	400-620	340	1994	Curis Arizona	Aquifer test conducted 3/8/94 to 3/21/94.
PW2-2	Test	D(4-9)28dcb	745543.2N 649854.3E	1464.3	1465.2	800	6"	460-760	360	1994	Curis Arizona	Pump test conducted 4/20/94 to 5/2/94.
PW3-1	Test	D(4-9)28cbb	746250.7N 647873.6E	1475.5	1476.4	800	6"	500-780	430	1994	Curis Arizona	Aquifer test conducted 3/24/94 to 3/31/94.
PW4-1	Test	D(4-9)28cca	745530.8N 647769.7E	1471.8	1472.15	800	6"	440-780	380	1994	Curis Arizona	Aquifer test conducted 5/19/94 to 5/31/94.
PW7-1	Test	D(4-9)28cda	745467.9N 648823.5E	1468.6	1468.6	900	6"	540-880	370	1994	Curis Arizona	
Airshaft (North Shaft)	Shaft	D(4-9)28dbc aka: D(4-9)28dbc1	746460.4N 649349.8E	1476	NA	706	42"; 0-700	NA	350	1974	Curis Arizona	
Shaft No. 1 (South Shaft)	Shaft	D(4-9)28dbc aka: D(4-9)28dbc2	746374.9N 649349.5E	1476	NA	730	72"; 0-715	NA	310	1974	Curis Arizona	
84	Exploration Borehole	D(4-9)28add	747250.0N 651188.0E	1480.5	NA	340	3"	NA	338	NA	Curis Arizona	Well has been plugged off.

Table C-2. Summary of Information for all Non-Class III Wells in the Area of Review

Well ID*	Well Type	Location/ ADWR No.**	Location Coordinates (Northing Easting)	Land Elevation (feet)[a]	Reference Point Elevation (feet)[a]	Total Depth (feet)[b]	Casing Diameter, Depth (inches; feet bgs)	Screened Interval (feet)[b]	Top of Bedrock (feet)[b]	Date Installed	Well Owner	Condition/Remarks
BIA 9	Irrigation	D(4-9)28cca 55-621948 aka: D(4-9)28cca2 D(4-9)28cdb	745732.4N 647305.3E	1472.5	1472.5	495	20"; 0-254 16"; 254-495	80-495	NA	NA	SCIDD	Top oil drip. Sounding tube. Flow meter removed.
BIA 10B	Irrigation	D(4-9)28cda 55-621949 aka: D(4-9)28cda2	745639.3N 649114.8E	1467.12	1468.6	2006	20"; 0-909 13"; 909-1,909	200-1,909	345	8/15/72	SCIDD	Sounding tube. Drip oil. Flow meter. Plug in side of discharge pipe.
DM-A	Test	D(4-9)28cad aka: D(4-9)28cad2	746381.8N 649148.5E	1477.05	1478.7	700	5"; 0-382	NA	310	NA	Curis Arizona	Unable to locate.
DM-B	Test	D(4-9)28cac 55-806521	746381.7N 648246.9E	1477.3	1478.11	700	5"; 0-611 4"; 611-700	NA	574	NA	Curis Arizona	Unable to locate.
DM-C	Test	D(4-9)28dbd 55-806520 aka: D(4-9)28dbd1	746384.9N 650185.4E	1471.49	1473.1	610	5"; 0-358	NA	338	1974	Curis Arizona	
DM-D	Test	D(4-9)28dba aka: D(4-9)28dbd	746842.3N 649740.3E	1478.85	1480.1	635	5"; 0-364	NA	350	NA	Curis Arizona	Unable to locate.
DM-E	Test	D(4-9)28ddb	745516.1N 650741.5E	1465	1464.94	700	5"; 0-392	NA	342	NA	Curis Arizona	Unable to locate.
M1-GL	Monitor (POC)	D(4-9)33bac 55-547617	743800.8N 648501.5E	1461.1	1462.4	365	5"; 0-365	315-355	NA	6/17/95	Curis Arizona	1.5-foot LCS casing stickup. Installed pump at 200 feet; Grundfos Model 10S-10-15, 1.0 HP, 460V
M2-GU	Monitor (POC)	D(4-9)33bbc 55-547814	743737.9N 651658.4E	1459	1460.8	265	5"; 0-258	198-238	NA	5/25/95	Curis Arizona	1.5-foot LCS casing stickup. Installed pump at 200 feet; Grundfos Model 10S-10-15, 1.0 HP, 460V
M3-GL	Monitor (POC)	D(4-9)33bbc 55-547614	743685.6N 651636.8E	1458.8	1460.74	365	5"; 0-358.5	298-338	NA	5/23/95	Curis Arizona	1.5-foot LCS casing stickup. Installed pump at 200 feet; Grundfos Model 10S-10-15, 1.0 HP, 460V
M4-O	Monitor (POC)	D(4-9)33bbc 55-547615	743717.4N 651635.2E	1458.9	1460.6	490	5"; 0-485	405-465	370	5/21/95	Curis Arizona	1.5-foot LCS casing stickup. Installed pump at 380 feet; Grundfos Model 10S-15-21, 1.5 HP, 460V.
M5-S	Monitor	D(4-9)33bbc 55-547616	743719.5N 651685.5E	1459.1	1460.47	613	5"; 0-516 4"; 516-597	516-576	370	5/18/95	Curis Arizona	1.5-foot LCS casing stickup. Installed pump at 500 feet; Grundfos Model 25S-20-26, 2.0 HP, 460V.

Table C-2. Summary of Information for all Non-Class III Wells in the Area of Review

Well ID*	Well Type	Location/ ADWR No.**	Location Coordinates (Northing Easting)	Land Elevation (feet)[a]	Reference Point Elevation (feet)[a]	Total Depth (feet)[b]	Casing Diameter, Depth (inches; feet bgs)	Screened Interval (feet)[b]	Top of Bedrock (feet)[b]	Date Installed	Well Owner	Condition/Remarks
M6-GU	Monitor (POC)	D(4-9)28bcc 55-547815	747556.5N 647256.9E	1480.5	1481.72	590	5"; 0-583	524-564	NA	3/31/95	Curis Arizona	1.5-foot PVC casing stickup. Installed pump at 500 feet; Grundfos Model 10S-20-27, 2.0 HP, 460V.
M7-GL	Monitor (POC)	D(4-9)28bcc 55-547611	747531.7N 647282.2E	1480	1480.95	940	5"; 0-592 4"; 592-928	859-919	NA	4/6/95	Curis Arizona	1.0-foot LCS casing stickup. Installed pump at 580 feet; Grundfos Model 10S-50-58DS, 5.0 HP, 460V.
M8-O	Monitor (POC)	D(4-9)28bcc 55-547612	747523.8N 647230.4E	1479.9	1480.46	1115	5"; 0-591 4"; 591-1091	1,010-1,070	950	4/12/95	Curis Arizona	Installed pump at 580 feet; Grundfos Model 7S-15-26, 1.5 HP, 460V.
M9-S	Monitor	D(4-9)28bcc 55-547613	747555.9N 647207.6E	1480.2	1481.18	1578	5"; 0-502 4"; 502-1570	1,510-1,570	930	3/23/95	Curis Arizona	Installed pump at 1377 feet; Grundfos Model 10S-50-48DS, 5.0 HP, 460V.
M10-GU	Monitor	D(4-9)28dcb 55-547816	745467.5N 649798.3E	1464.3	1465.77	290	5"; 0-268	218-258	NA	5/10/95	Curis Arizona	Installed pump at 200 feet; Grundfos Model 10S-10-15, 1.5 HP, 460V.
M11-GL	Monitor (POC)	D(4-9)28dcb 55-547817	745471.7N 649749.8E	1464.6	1466.01	370	5"; 0-350	290-330	NA	5/9/95	Curis Arizona	1.5-foot LCS casing stickup. Installed pump at 260 feet; Grundfos Model 10S-10-15, 1.0 HP, 460V.
M12-O	Monitor	D(4-9)28dcb 55-547818	745506.1N 649798.2E	1464.3	1465.56	510	5"; 0-501	420-480	350	5/6/95	Curis Arizona	1.5-foot LCS casing stickup. Installed pump at 260 feet; Grundfos Model 10S-15-21, 1.5 HP, 460V.
M13-S	Monitor	D(4-9)28dcb 55-547819	745507.6N 649748.9E	1464.3	1465.86	943	5"; 0-931	851-911	355	4/25/95	Curis Arizona	1.8-foot LCS casing stickup. Installed pump at 840 feet; Grundfos Model 16S-50-38, 5.0 HP, 460V.
M14-GL	Monitor (POC)	D(4-9)28cbc 55-549172	746414.7N 646961.2E	1473.2	1474.58	950	5"; 0-859	778-838	830	6/2/95	Curis Arizona	1.5-foot LCS casing stickup. Installed pump at 260 feet; Grundfos Model 10S-10-15, 1.0 HP, 460V.
M15-GU	Monitor (POC)	D(4-9)28cbc 55-547813	746418.0N 646908.1E	1473.1	1474.01	630	5"; 0-615	554-594	NA	6/6/95	Curis Arizona	1.5-foot LCS casing stickup. Installed pump at 260 feet; Grundfos Model 10S-10-15, 1.0 HP, 460V.
M16-GU	Monitor (POC)	D(4-9)28acc 55-549140	745025.4N 647017.4E	1465.8	1466.05	690	5"; 0-678	598-658	NA	6/22/95	Curis Arizona	1.5-foot LCS casing stickup. Installed pump at 260 feet; Grundfos Model 5S-10-22, 1.0 HP, 460V.
M17-GL	Monitor (POC)	D(4-9)28acc 55-549141	744976.8N 647017.0E	1465.8	1466.16	1132	5"; 0-1,018.5	938-998	1080	6/18/95	Curis Arizona	2.5-foot LCS casing stickup. Installed pump at 340 feet; Grundfos Model 10S-15-21, 1.5 HP, 460V.
M18-GU	Monitor (POC)	D(4-9)33bac 55-547809	743800.8N 648501.5E	1461	1461.75	470	5"; 0-228	178-218	380	6/18/95	Curis Arizona	1.5-foot LCS casing stickup. Installed pump at 170 feet; Grundfos Model 10S-10-15, 1.0 HP, 460V.
M19-LBF	Monitor (POC)	55-555828	747381.5N 648971.7E	1489.3	1490.05	340	6	315-330	NA	4/9/96	Curis Arizona	

Table C-2. Summary of Information for all Non-Class III Wells in the Area of Review

Well ID*	Well Type	Location/ ADWR No.**	Location Coordinates (Northing Easting)	Land Elevation (feet)[a]	Reference Point Elevation (feet)[a]	Total Depth (feet)[b]	Casing Diameter, Depth (inches; feet bgs)	Screened Interval (feet)[b]	Top of Bedrock (feet)[b]	Date Installed	Well Owner	Condition/Remarks
M20-O	Monitor (POC)	55-555829	747382.7N 648921.2E	1487.2	1489.98	588	5	469-499	350	4/6/96	Curis Arizona	
M21-UBF	Monitor (POC)	55-555823	747330.6N 648967.0E	1486.9	1489.52	290	6	240-280	NA	4/8/96	Curis Arizona	
M22-O	Monitor (POC)	55-555831	746467.7N 646962.2E	1473.3	1476.06	1150	4	932-1130	880	4/11/96	Curis Arizona	
M23-UBF	Monitor (POC)	55-555824	746465.7N 646899.1E	1473.3	1475.16	260	6	210-250	NA	4/13/96	Curis Arizona	
M24-O	Monitor (POC)	55-555832	745415.8N 647027.5E	1466.5	1469.29	1282	5	1058-1259	1000	4/17/96	Curis Arizona	
M25-UBF	Monitor (POC)	D(4-9)28ccb 55-555825	745464.6N 647018.9E	1466.6	1469.27	260	6.5	210-250	NA	4/19/96	Curis Arizona	
M26-O	Monitor (POC)	55-555833	747693.9N 647809.8E	1486	1488.41	1120	4	840-1038	790	4/23/96	Curis Arizona	
M27-LBF	Monitor (POC)	55-555827	747695.2N 647760.4E	1486.1	1488.85	455	6	374-435	NA	4/24/96	Curis Arizona	
M28-LBF	Monitor (POC)	55-555834	747746.9N 647751.7E	1486.8	1489.45	760	4	681-741	NA	4/26/96	Curis Arizona	
M29-UBF	Monitor (POC)	55-555830	747748.1N 647819.4E	1487	1489.49	290	6	237-277	NA	4/28/96	Curis Arizona	
M30-O	Monitor (POC)	55-555826	747378.8N 649939.9E	1484.1	1486.36	575	6	387-555	310	4/30/96	Curis Arizona	
M31-LBF	Monitor (POC)	55-556090	747333.4N 649978.9E	1483.4	1475.09	325	6	300-320	NA	4/10/96	Curis Arizona	
M32-UBF	Monitor (POC)	55-556091	746415.2N 651458.9E	1472.7	1475.09	180	6	130-170	NA	4/30/96	Curis Arizona	
M33-UBF	Monitor (POC)	55-556092	747486.5N 652645.5E	1487.9	1490.1	180	6	130-170	NA	4/15/96	Curis Arizona	
O3-GL	Monitor	D(4-9)28cda 55-549153	745444.3N 648922.4E	1468.1	1469.35	395	5"; 0-385	325-365	380	5/11/95	Curis Arizona	1.6-foot LCS casing stickup. Aquifer test performed 6/95, 8/95, 9/95.
O5.1-O	Monitor	D(4-9)28dcc 55-549144	744708.0N 649599.8E	1462.2	1463.44	880	5"; 0-494 4"; 494-853	674-832	360	5/25/95	Curis Arizona	1.5-foot LCS casing stickup.
O5.2-O	Monitor	D(4-9)28dcc 55-549145	744701.2N 649524.7E	1462.2	1463.47	880	4"; 0-792	712-771	380	5/20/95	Curis Arizona	1.5-foot LCS casing stickup.

Table C-2. Summary of Information for all Non-Class III Wells in the Area of Review

Well ID*	Well Type	Location/ ADWR No.**	Location Coordinates (Northing Easting)	Land Elevation (feet)[a]	Reference Point Elevation (feet)[a]	Total Depth (feet)[b]	Casing Diameter, Depth (inches; feet bgs)	Screened Interval (feet)[b]	Top of Bedrock (feet)[b]	Date Installed	Well Owner	Condition/Remarks
P5-O	Monitor	D(4-9)28dcc 55-549147	744696.9N 649499.2E	1462.4	1463.8	800	6"; 0-790	414-454 473-513 533-572 592-632 671-691 711-730 750-770	322	5/22/95	Curis Arizona	1.5-foot PVC casing stickup.
O8-O	Monitor	D(4-9)28dbb 55-549164	746903.1N 649393.3E	1479.5	1481.3	610	4"; 0-599.5	401.5-579	355	8/26/95	Curis Arizona	1.5-foot LCS casing stickup. Aquifer test performed 9/95.
O8-GU	Monitor	D(4-9)28dbb 55-549165	746792.7N 649386.2E	1478	1479.8	270	4"; 0-261	133-251	NA	8/16/95	Curis Arizona	1.5-foot LCS casing stickup. Aquifer test performed 9/95.
P8.1-O	Monitor	D(4-9)28dbb 55-549166	746793.4N 649403.8E	1478	1478.8	616	6"; 0-600	399.5-580	350	8/14/95	Curis Arizona	1.5-foot LCS casing stickup. Aquifer test performed 9/95.
P8.2-O	Monitor	D(4-9)28dbb 55-549166	746863.7N 649289.9E	1478.2	1479.7	610	6"; 0-596.5	396-576	380	8/23/95	Curis Arizona	1.5-foot LCS casing stickup. Aquifer test performed 9/95.
P8-GU	Monitor	D(4-9)28dbb 55-549167	746846.8N 649293.5E	1477.7	1479.7	270	6"; 0-259	128-248	NA	8/25/95	Curis Arizona	1.5-foot LCS casing stickup. Aquifer test performed 9/95.
O12-O	Monitor	D(4-9)28cdc 55-549169	744745.6N 648411.8E	1466.5	1469.06	970	4"; 0-950	434-929	380	5/18/95	Curis Arizona	2.0-foot LCS casing stickup. Aquifer test performed 6/95, 8/95, 9/95.
O12-GL	Monitor	D(4-9)28cdc 55-549170	744739.9N 648436.7E	1466.2	1468.09	395	5"; 0-385	325-365	350	5/11/95	Curis Arizona	1.6-foot LCS casing stickup. Aquifer test performed 6/95, 8/95, 9/95.
P12-O	Monitor	D(4-9)28cdc 55-549171	744708.3N 648473.3E	1466	1467.85	999	6"; 0-960	440-940	380	5/9/95	Curis Arizona	.81-foot LCS casing stickup. Aquifer test performed 6/95, 8/95, 9/95.
O13-O	Monitor	D(4-9)28cba 55-547812	746889.9N 647598.6E	1479.4	1481.48	1440	4"; 0-1413	770-1,393	650	8/2/95	Curis Arizona	1.5-foot LCS casing stickup.
P13.2-O	Monitor	D(4-9)28cba 55-547810	746807.6N 647653.8E	1479.2	1480.08	1400	6"; 0-1380	781-1,379	647	7/27/95	Curis Arizona	1.5-foot LCS casing stickup.
P13.1-O	Monitor	D(4-9)28cba 55-547808	746799.4N 647551.2E	1478.5	1479.97	1475	6"; 0-1449	772-1,449	720	7/16/95	Curis Arizona	1.5-foot LCS casing stickup.
P13-GL	Monitor	D(4-9)28cba 55-547811	746802.3N 647400.1E	1477.4	1479.29	770	6"; 0-760	690-760	NA	8/11/95	Curis Arizona	1.5-foot LCS casing stickup.
O15-O	Monitor	D(4-9)28cca 55-549160	745376.9N 647508.4E	1467.5	1468.69	1330	4"; 0-1,315	632-1,296	553	7/1/95	Curis Arizona	Aquifer test performed 8/95, 9/95.
P15-O	Monitor	D(4-9)28cca 55-549158	745428.6N 647596.4E	1468	1469.32	1380	6"; 0-1321	580-1300	485	6/20/95	Curis Arizona	Aquifer test performed 8/95, 9/95.
P15-GL	Monitor	D(4-9)28cca 55-549161	745437.8N 647505.2E	1467.5	1468.61	500	6"; 0-491	421-481	NA	7/3/95	Curis Arizona	Aquifer test performed 8/95, 9/95.

Table C-2. Summary of Information for all Non-Class III Wells in the Area of Review

Well ID*	Well Type	Location/ ADWR No.**	Location Coordinates (Northing Easting)	Land Elevation (feet)[a]	Reference Point Elevation (feet)[a]	Total Depth (feet)[b]	Casing Diameter, Depth (inches; feet bgs)	Screened Interval (feet)[b]	Top of Bedrock (feet)[b]	Date Installed	Well Owner	Condition/Remarks
O19-O	Monitor	D(4-9)28bdc 55-549149	747350.4N 648359.5E	1482.7	1483.69	630	4"; 0-627	410-608	400	6/7/95	Curis Arizona	3.0-foot PVC casing stickup. Aquifer test performed 7/95, 9/95.
O19-GL	Monitor (POC)	D(4-9)28bdc 55-549150	747359.3N 648233.6E	1481.7	1483.28	460	5"; 0-455	375-435	NA	6/14/95	Curis Arizona	1.5-foot LCS casing stickup. Aquifer test performed 7/95, 9/95.
P19.1-O	Test (POC)	D(4-9)28bdc 55-549151	747345.8N 648427.9E	1483	1484.72	680	6"; 0-621	402-600	355	6/4/95	Curis Arizona	2.0-foot LCS casing stickup. Aquifer test performed 7/95, 9/95.
P19.2-O	Monitor	D(4-9)28bdc 55-549152	747413.6N 648397.1E	1482.6	1484.23	630	6"; 0-622	404-602	420	6/8/95	Curis Arizona	1.5-foot LCS casing stickup. Aquifer test performed 7/95, 9/95.
O28-GL	Monitor	D(4-9)28ddb 55-547805	745592.7N 650966.7E	1464.8	1465.66	320	4"; 0-307	277-307	NA	7/4/95	Curis Arizona	1.5-foot LCS casing stickup. Aquifer test performed 8/95, 9/95.
O28.1-O	Monitor	D(4-9)28ddb 55-547803	745652.0N 651027.9E	1464.6	1465.76	530	4"; 0-514	395-494	350	6/21/95	Curis Arizona	1.5-foot LCS casing stickup. Aquifer test performed 8/95, 9/95.
O28.2-S	Monitor	D(4-9)28ddb 55-547804	745621.1N 651123.9E	1464.8	1465.54	510	4"; 0-495	454-494	340	6/19/95	Curis Arizona	1.5-foot LCS casing stickup. Aquifer test performed 8/95, 9/95.
P28-GL	Monitor	D(4-9)28ddb 55-547807	745535.8N 651085.7E	1465	1466.48	320	5"; 0-309	279-309	NA	6/30/95	Curis Arizona	1.5-foot LCS casing stickup. Aquifer test performed 8/95, 9/95.
P28.1-O	Monitor	D(4-9)28ddb 55-547802	745558.5N 650998.3E	1464.9	1466.48	520	6"; 0-509	399-499	360	7/2/95	Curis Arizona	1.5-foot LCS casing stickup. Aquifer test performed 8/95, 9/95.
P28.2-O	Monitor	D(4-9)28ddb 55-547806	745516.2N 651118.2E	1465.4	1466.68	519	6"; 0-507	398-497	335	6/29/95	Curis Arizona	1.5-foot LCS casing stickup. Aquifer test performed 8/95, 9/95.
O39-O	Monitor	D(4-9)28bcd 55-549174	744220.5N 649098.1E	1463.1	1464.29	916	5"; 0-910	474-890	400	5/7/95	Curis Arizona	1.6-foot LCS casing stickup. Aquifer test performed 5/95.
P39-O	Monitor	D(4-9)28bcd 55-549176	744102.5N 649102.7E	1461.7	1462.85	915	6"; 0-847	471-826	380	5/10/95	Curis Arizona	2.0-foot PVC casing stickup. Aquifer test performed 5/95.
O49-O	Monitor	D(4-9)33bba 549179	744195.3N 647517.2E	1461.8	1462.69	1280	4"; 0-1247	832-1227.5	810	6/6/95	Curis Arizona	1-foot PVC casing stickup.
O49-GL	Monitor (POC)	D(4-9)33bba 55-549180	744193.9N 647477.4E	1461.2	1462.08	740	5"; 0-730	661-721	NA	6/15/95	Curis Arizona	1.1-foot PVC casing stickup.
P49-O	Test (POC)	55-549181	744202.7N 647611.9E	1461.8	1463.12	1288	6"; 0-1242.5	808-1222	740	5/24/95	Curis Arizona	.9-foot LCS casing stickup.

[a] *Feet above mean sea level (amsl)*

[b] *Feet below ground surface (bgs)*

* *The well ID listed first identifies the well name most commonly used with respect to documentation and well recognition. Any other names found for a particular well are also listed as a reference.*

** *The correct well identification is based on location and is listed first followed by all other numbers referenced to that well as found in various reports and documents.*

NA - Not Available

POC - Point of Compliance

SCIDD - San Carlos Irrigation and Drainage District

Table C-3. Coreholes that Penetrate the Proposed Injection Zone

Corehole ID	Location Coordinates		Collar Elevation (feet amsl)	Total Depth (feet bgs)	Corehole Type - Responsible Company
	Easting	Northing			
5	647924.8	747835.4	1,487.9	1,644.0	Exploration - Conoco
46	649680.3	747285.0	1,481.2	700.0	Exploration - Conoco
137	647946.3	747250.4	1,482.1	664.0	Exploration - Conoco
138	648693.8	747247.9	1,483.2	863.0	Exploration - Conoco
144	649201.2	747249.5	1,483.2	632.0	Exploration - Conoco
151	647181.1	747252.3	1,477.9	1,547.0	Exploration - Conoco
152	650196.1	747247.1	1,482.3	710.0	Exploration - Conoco
153	648196.5	747258.4	1,482.2	1,204.0	Exploration - Conoco
210	647226.6	747891.1	1,484.0	1,382.0	Exploration - Conoco
260	649816.1	746165.5	1,472.9	1,410.5	Exploration - Conoco
316	648379.1	747253.6	1,482.8	762.0	Exploration - Conoco
362	649446.4	747250.9	1,482.8	330.0	Exploration - Conoco
363	649571.4	747467.4	1,483.8	330.0	Exploration - Conoco
364	649946.4	747250.9	1,482.4	320.0	Exploration - Conoco
100MF	648446.9	744221.4	1,464.0	2,146.0	Exploration - Conoco
102MF	648697.7	744653.9	1,466.3	2,454.0	Exploration - Conoco
103MF	648696.6	745433.9	1,470.0	2,215.0	Exploration - Conoco
105MF	649196.4	745518.9	1,467.5	2,264.0	Exploration - Conoco
106MF	649196.8	744653.1	1,464.0	2,382.0	Exploration - Conoco
107MF	649447.6	744218.1	1,460.6	1,569.0	Exploration - Conoco
108MF	649932.3	745085.8	1,463.1	1,994.5	Exploration - Conoco
109MF	647449.6	744221.0	1,461.8	1,847.0	Exploration - Conoco
110S	647445.6	746819.6	1,478.1	1,738.0	Exploration - Conoco
11PB	650320.0	745430.0	1,468.0	525.0	Exploration - Conoco
123MF	649196.4	743786.7	1,460.5	1,337.0	Exploration - Conoco
124MF	650191.2	745507.8	1,465.1	1,607.0	Exploration - Conoco
125MF	647201.1	744647.7	1,464.3	2,115.0	Exploration - Conoco
126MF	647204.9	745516.2	1,467.9	2,004.0	Exploration - Conoco
127MF	647700.6	743782.1	1,460.2	1,954.0	Exploration - Conoco
128MF	647702.0	747253.2	1,484.2	1,666.0	Exploration - Conoco
129S	648719.8	746378.6	1,478.0	2,260.0	Exploration - Conoco
131MF	651191.8	745513.8	1,465.3	864.0	Exploration - Conoco
132MF	649449.4	745084.0	1,464.7	2,280.0	Exploration - Conoco
133S	647690.9	746398.0	1,475.5	2,217.0	Exploration - Conoco
134MF	647704.4	744648.9	1,466.1	2,098.0	Exploration - Conoco
135MF	647713.6	745551.6	1,472.2	2,095.5	Exploration - Conoco
136S	648452.5	746812.0	1,480.2	1,448.0	Exploration - Conoco
139S	649198.5	746381.8	1,477.1	2,086.0	Exploration - Conoco
140S	649693.1	746382.2	1,473.8	1,289.0	Exploration - Conoco
141S	650929.9	746873.2	1,477.3	763.0	Exploration - Conoco
142MF	650198.0	744663.8	1,461.6	1,897.0	Exploration - Conoco
145MF	648192.8	745523.3	1,473.0	2,170.0	Exploration - Conoco
146MF	650943.9	745143.3	1,465.4	940.0	Exploration - Conoco
147MF	650441.3	744214.4	1,458.9	723.0	Exploration - Conoco
148MF	649699.8	743784.3	1,458.2	1,021.0	Exploration - Conoco
149S	648196.9	746381.7	1,477.3	2,142.5	Exploration - Conoco
150S	647186.3	746383.3	1,474.6	2,050.0	Exploration - Conoco
154S	650694.2	746382.8	1,473.4	1,073.0	Exploration - Conoco

Table C-3. Coreholes that Penetrate the Proposed Injection Zone

Corehole ID	Location Coordinates		Collar Elevation (feet amsl)	Total Depth (feet bgs)	Corehole Type - Responsible Company
	Easting	Northing			
155S	651203.3	746379.2	1,476.2	1,378.0	Exploration - Conoco
156S	649948.4	746812.4	1,480.4	955.0	Exploration - Conoco
165MF	647199.8	743783.8	1,458.0	2,088.0	Exploration - Conoco
171MF	647448.8	745082.9	1,467.2	2,044.0	Exploration - Conoco
172MF	646943.7	745087.3	1,464.9	2,174.0	Exploration - Conoco
175MF	646701.4	745510.6	1,465.4	1,260.0	Exploration - Conoco
18S	648946.4	745951.9	1,472.6	2,066.0	Exploration - Conoco
254S	649324.5	746599.5	1,478.7	1,674.0	Exploration - Conoco
255S	649442.9	746815.8	1,478.2	1,235.0	Exploration - Conoco
256S	649445.6	746381.6	1,474.0	1,667.0	Exploration - Conoco
257S	649325.4	746163.8	1,474.7	1,858.0	Exploration - Conoco
258S	650069.0	746598.8	1,476.1	1,261.0	Exploration - Conoco
259S	649941.4	746380.3	1,474.0	1,179.0	Exploration - Conoco
261S	649570.1	746164.1	1,472.2	1,625.0	Exploration - Conoco
262S	650195.3	745954.4	1,469.1	1,132.5	Exploration - Conoco
263MF	649821.6	745734.6	1,465.9	1,510.0	Exploration - Conoco
264MF	649944.0	745519.7	1,464.8	1,725.0	Exploration - Conoco
265MF	650073.3	745301.4	1,465.1	1,664.5	Exploration - Conoco
266S	649696.6	745951.7	1,469.7	1,540.0	Exploration - Conoco
267S	650573.0	745733.8	1,465.4	1,163.3	Exploration - Conoco
268MF	650322.6	745735.9	1,465.0	1,180.0	Exploration - Conoco
269S	651192.6	745954.9	1,469.4	1,106.0	Exploration - Conoco
279S	649821.0	746598.4	1,477.0	1,393.0	Exploration - Conoco
280S	649571.3	746600.0	1,476.1	1,463.0	Exploration - Conoco
282S	650080.0	746091.8	1,470.8	1,289.0	Exploration - Conoco
28S	648431.5	745967.5	1,475.2	2,227.0	Exploration - Conoco
326S	650946.4	746384.9	1,473.3	1,117.0	Exploration - Conoco
327S	650821.4	746601.4	1,475.0	879.0	Exploration - Conoco
328S	650571.4	746601.4	1,477.0	1,066.5	Exploration - Conoco
329S	650446.4	746384.9	1,474.0	1,021.0	Exploration - Conoco
32MF	649007.3	744429.1	1,464.3	2,732.0	Exploration - Conoco
330S	650581.1	746182.3	1,472.9	1,083.0	Exploration - Conoco
331S	651321.4	746168.4	1,473.0	698.0	Exploration - Conoco
333S	650821.4	746168.4	1,472.8	1,049.5	Exploration - Conoco
334S	651071.4	746168.4	1,473.0	1,058.0	Exploration - Conoco
335S	651196.4	746817.9	1,477.4	855.0	Exploration - Conoco
336S	651071.4	746601.4	1,476.7	769.0	Exploration - Conoco
337S	651321.4	746601.4	1,475.1	1,368.0	Exploration - Conoco
338S	651446.4	746817.9	1,477.0	330.0	Exploration - Conoco
339S	651071.4	747034.4	1,478.9	729.0	Exploration - Conoco
33S	650131.7	746295.1	1,472.4	1,468.0	Exploration - Conoco
340S	650821.4	747034.4	1,478.0	938.9	Exploration - Conoco
341S	650571.4	747034.4	1,477.7	694.0	Exploration - Conoco
342S	650321.4	747034.4	1,480.0	648.8	Exploration - Conoco
343S	650071.4	747034.4	1,480.6	872.5	Exploration - Conoco
344S	650696.4	746817.9	1,475.0	613.0	Exploration - Conoco
345S	649821.4	747034.4	1,479.8	1,034.0	Exploration - Conoco
346S	649571.4	747034.4	1,478.4	832.0	Exploration - Conoco

Table C-3. Coreholes that Penetrate the Proposed Injection Zone

Corehole ID	Location Coordinates		Collar Elevation (feet amsl)	Total Depth (feet bgs)	Corehole Type - Responsible Company
	Easting	Northing			
347S	649321.4	747034.4	1,482.1	905.0	Exploration - Conoco
348S	649071.4	747034.4	1,484.7	1,114.0	Exploration - Conoco
349S	649196.4	746817.9	1,479.3	1,537.0	Exploration - Conoco
350S	649071.4	746601.4	1,481.2	1,586.0	Exploration - Conoco
351S	648821.4	747034.4	1,483.9	1,088.5	Exploration - Conoco
352S	648821.4	746601.4	1,477.9	2,080.0	Exploration - Conoco
353S	648571.4	747024.5	1,482.0	1,082.5	Exploration - Conoco
354S	648321.4	747034.4	1,481.2	1,193.5	Exploration - Conoco
355S	648196.4	746817.9	1,479.6	1,606.0	Exploration - Conoco
356S	648071.4	746601.4	1,478.0	2,094.0	Exploration - Conoco
357S	647946.4	746384.9	1,476.9	2,280.0	Exploration - Conoco
358S	648571.4	746168.4	1,477.7	2,449.0	Exploration - Conoco
359S	648696.4	745951.9	1,473.0	2,689.0	Exploration - Conoco
360S	648821.4	746168.4	1,473.6	2,344.0	Exploration - Conoco
361S	648946.4	746384.9	1,478.5	2,237.0	Exploration - Conoco
365S	650321.4	746601.4	1,479.3	1,299.0	Exploration - Conoco
366S	648071.4	746168.4	1,476.4	425.0	Exploration - Conoco
370S	649071.4	746168.4	1,473.9	2,206.0	Exploration - Conoco
371S	649196.4	745951.9	1,472.6	2,075.2	Exploration - Conoco
372S	650294.3	746212.6	1,472.5	1,215.0	Exploration - Conoco
373MF	649571.4	745735.4	1,466.5	1,829.0	Exploration - Conoco
379MF	650821.4	744869.4	1,461.9	350.0	Exploration - Conoco
380MF	650571.4	744869.4	1,461.9	1,302.0	Exploration - Conoco
381MF	650321.4	744869.4	1,461.7	1,710.0	Exploration - Conoco
382MF	650071.4	744869.4	1,461.6	1,829.0	Exploration - Conoco
383MF	650321.4	745302.4	1,465.5	1,449.0	Exploration - Conoco
384MF	650571.4	745302.4	1,465.3	1,218.0	Exploration - Conoco
385MF	650821.4	745302.4	1,465.6	973.0	Exploration - Conoco
387MF	650946.4	745518.9	1,465.3	1,076.0	Exploration - Conoco
388MF	651071.4	745685.4	1,465.4	1,078.5	Exploration - Conoco
389MF	649321.4	744436.4	1,462.4	2,446.9	Exploration - Conoco
390MF	649571.4	744436.4	1,461.4	1,702.0	Exploration - Conoco
391MF	649821.4	744436.4	1,460.4	1,763.0	Exploration - Conoco
392MF	650071.4	744436.4	1,461.7	1,674.3	Exploration - Conoco
393MF	650321.4	744436.4	1,462.4	1,537.0	Exploration - Conoco
394MF	650446.4	744652.9	1,461.5	1,652.0	Exploration - Conoco
395MF	650696.4	745085.9	1,461.8	1,517.0	Exploration - Conoco
396MF	651321.4	745685.4	1,465.3	807.6	Exploration - Conoco
397MF	648946.4	745518.9	1,468.6	350.0	Exploration - Conoco
398MF	649446.4	745518.9	1,466.1	2,201.0	Exploration - Conoco
399MF	649071.4	745685.4	1,467.7	2,240.0	Exploration - Conoco
400MF	649321.4	745685.4	1,467.2	2,094.5	Exploration - Conoco
401MF	650071.4	745685.4	1,465.1	1,254.0	Exploration - Conoco
402MF	650446.4	745518.9	1,465.5	1,230.0	Exploration - Conoco
403MF	650821.4	745685.4	1,466.0	1,120.5	Exploration - Conoco
404S	650196.4	746817.9	1,480.3	947.0	Exploration - Conoco
405S	650696.4	745951.9	1,471.9	1,163.0	Exploration - Conoco
407MF	648821.4	745302.4	1,468.3	370.0	Exploration - Conoco

Table C-3. Coreholes that Penetrate the Proposed Injection Zone

Corehole ID	Location Coordinates		Collar Elevation (feet amsl)	Total Depth (feet bgs)	Corehole Type - Responsible Company
	Easting	Northing			
408MF	649071.4	745302.4	1,467.2	370.0	Exploration - Conoco
409MF	649321.4	745302.4	1,466.3	2,304.0	Exploration - Conoco
410MF	649571.4	745302.4	1,465.0	2,185.0	Exploration - Conoco
411MF	649821.4	745302.4	1,463.9	1,935.0	Exploration - Conoco
412MF	649696.4	745085.9	1,463.8	2,329.0	Exploration - Conoco
413MF	650196.4	745085.9	1,461.9	1,685.0	Exploration - Conoco
414S	648446.4	746384.9	1,477.5	2,267.0	Exploration - Conoco
415S	648321.4	746601.4	1,479.5	2,042.0	Exploration - Conoco
416S	648571.4	746601.4	1,482.8	2,088.0	Exploration - Conoco
417S	648071.4	747034.4	1,481.1	1,271.0	Exploration - Conoco
418MF	648734.1	745704.2	1,468.0	355.0	Exploration - Conoco
420S	648696.4	746817.9	1,481.9	1,662.0	Exploration - Conoco
422MF	649196.4	745085.9	1,466.0	2,647.0	Exploration - Conoco
424MF	648571.4	744869.4	1,467.2	375.0	Exploration - Conoco
428MF	649696.4	744219.9	1,460.2	1,958.5	Exploration - Conoco
429MF	649571.4	744003.3	1,460.0	1,751.0	Exploration - Conoco
430MF	649446.4	743786.8	1,459.3	1,545.0	Exploration - Conoco
431MF	649571.4	744869.4	1,463.6	2,242.0	Exploration - Conoco
432MF	649821.4	744869.4	1,462.5	1,922.0	Exploration - Conoco
433MF	648946.4	744219.9	1,463.3	2,251.0	Exploration - Conoco
435MF	649446.4	744652.9	1,462.7	2,082.0	Exploration - Conoco
436MF	649946.4	744652.9	1,461.5	1,752.0	Exploration - Conoco
437MF	648323.3	745381.6	1,472.3	365.0	Exploration - Conoco
439S	647826.1	747029.6	1,480.8	585.0	Exploration - Conoco
440S	647576.1	747029.6	1,481.1	680.0	Exploration - Conoco
441S	647326.1	747029.6	1,480.8	833.0	Exploration - Conoco
442S	647076.1	747029.6	1,475.7	823.0	Exploration - Conoco
443S	646826.1	747029.6	1,475.4	1,100.0	Exploration - Conoco
445S	647201.1	746813.1	1,477.5	870.0	Exploration - Conoco
446S	647701.1	746813.1	1,479.5	620.0	Exploration - Conoco
447S	647783.0	746600.0	1,476.9	593.0	Exploration - Conoco
448S	647576.1	746596.1	1,477.1	750.0	Exploration - Conoco
449S	647326.1	746596.1	1,475.8	920.0	Exploration - Conoco
450S	647076.1	746596.1	1,473.9	1,045.0	Exploration - Conoco
451S	646826.1	746596.1	1,473.0	1,025.0	Exploration - Conoco
452S	646951.1	746380.1	1,472.4	980.0	Exploration - Conoco
453S	647451.1	746380.1	1,475.5	870.0	Exploration - Conoco
454S	647785.0	746170.0	1,475.2	403.0	Exploration - Conoco
455S	647576.1	746163.6	1,473.6	553.0	Exploration - Conoco
456S	647326.1	746163.6	1,473.2	825.0	Exploration - Conoco
457S	647076.1	746163.6	1,471.5	943.0	Exploration - Conoco
458S	647201.1	745947.1	1,471.5	876.0	Exploration - Conoco
459S	647701.1	745947.1	1,474.0	483.0	Exploration - Conoco
45S	649025.8	746833.8	1,482.9	1,464.0	Exploration - Conoco
460MF	648071.4	745691.1	1,472.4	474.0	Exploration - Conoco
461MF	647777.1	745691.1	1,472.1	385.0	Exploration - Conoco
462MF	647571.4	745691.1	1,471.5	494.0	Exploration - Conoco
463MF	647368.0	745805.0	1,471.6	720.0	Exploration - Conoco

Table C-3. Coreholes that Penetrate the Proposed Injection Zone

Corehole ID	Location Coordinates		Collar Elevation (feet amsl)	Total Depth (feet bgs)	Corehole Type - Responsible Company
	Easting	Northing			
464MF	647446.4	745518.9	1,468.8	594.0	Exploration - Conoco
465MF	647951.1	745514.1	1,471.9	350.0	Exploration - Conoco
466MF	648076.1	745297.6	1,471.5	350.0	Exploration - Conoco
467MF	647821.4	745302.4	1,469.5	370.0	Exploration - Conoco
468MF	647571.4	745302.4	1,468.3	495.0	Exploration - Conoco
469MF	647321.4	745302.4	1,467.1	780.0	Exploration - Conoco
470MF	647071.4	745302.4	1,466.2	945.0	Exploration - Conoco
471MF	647196.4	745085.9	1,465.7	850.0	Exploration - Conoco
472MF	647696.4	745085.9	1,468.0	594.0	Exploration - Conoco
473MF	648196.4	745085.9	1,469.4	380.0	Exploration - Conoco
474MF	648321.4	744869.4	1,468.4	380.0	Exploration - Conoco
475MF	648071.4	744869.4	1,468.6	380.0	Exploration - Conoco
476MF	647821.4	744869.4	1,467.7	474.0	Exploration - Conoco
477MF	647571.4	744869.4	1,466.4	700.0	Exploration - Conoco
478MF	647321.4	744869.4	1,465.3	900.0	Exploration - Conoco
479MF	647446.4	744652.9	1,465.0	2,165.0	Exploration - Conoco
47S	649690.3	746842.3	1,478.9	1,092.0	Exploration - Conoco
480MF	647946.4	744652.9	1,467.0	455.0	Exploration - Conoco
481MF	648446.4	744652.9	1,466.6	380.0	Exploration - Conoco
482MF	648821.4	744386.4	1,464.1	400.0	Exploration - Conoco
483MF	648571.4	744436.3	1,464.7	380.0	Exploration - Conoco
484MF	648321.4	744436.3	1,465.1	385.0	Exploration - Conoco
485MF	648071.4	744436.3	1,465.3	495.0	Exploration - Conoco
486MF	647821.4	744436.3	1,465.1	580.0	Exploration - Conoco
487MF	647571.4	744436.3	1,463.7	1,964.0	Exploration - Conoco
488MF	647321.4	744436.3	1,462.8	2,075.0	Exploration - Conoco
489MF	647196.4	744219.8	1,460.7	2,122.0	Exploration - Conoco
48MF	648904.2	745039.6	1,467.1	2,621.0	Exploration - Conoco
490MF	647696.4	744219.8	1,462.7	2,013.0	Exploration - Conoco
491MF	648196.4	744219.8	1,463.7	395.0	Exploration - Conoco
492MF	648696.4	744219.8	1,463.4	390.0	Exploration - Conoco
493MF	649196.4	744219.8	1,462.0	1,762.0	Exploration - Conoco
494MF	649321.4	744003.3	1,460.4	2,427.0	Exploration - Conoco
495MF	649071.4	744003.3	1,461.8	1,812.0	Exploration - Conoco
496MF	648821.4	744003.3	1,462.0	390.0	Exploration - Conoco
497MF	648571.4	744003.3	1,462.1	380.0	Exploration - Conoco
498MF	648321.4	744003.3	1,462.1	400.0	Exploration - Conoco
499MF	648071.4	744003.3	1,462.3	520.0	Exploration - Conoco
500MF	647821.4	744003.3	1,462.0	2,062.0	Exploration - Conoco
501MF	647571.4	744003.3	1,460.9	1,295.0	Exploration - Conoco
502MF	647321.4	744003.3	1,459.6	1,858.0	Exploration - Conoco
503MF	647446.4	743786.8	1,458.9	1,899.5	Exploration - Conoco
504MF	647946.4	743786.8	1,460.5	1,910.0	Exploration - Conoco
505MF	648446.4	743786.8	1,460.6	400.0	Exploration - Conoco
506MF	648946.4	743786.8	1,460.6	1,961.0	Exploration - Conoco
507MF	649071.4	743570.3	1,456.8	1,857.0	Exploration - Conoco
508MF	648821.4	743570.3	1,459.8	1,910.0	Exploration - Conoco
509MF	648571.4	743570.3	1,460.1	1,873.0	Exploration - Conoco

Table C-3. Coreholes that Penetrate the Proposed Injection Zone

Corehole ID	Location Coordinates		Collar Elevation (feet amsl)	Total Depth (feet bgs)	Corehole Type - Responsible Company
	Easting	Northing			
510MF	648321.4	743570.3	1,459.8	1,822.0	Exploration - Conoco
511MF	648071.4	743570.3	1,459.4	1,856.0	Exploration - Conoco
512MF	647821.4	743570.3	1,459.2	1,859.0	Exploration - Conoco
513MF	647571.4	743570.3	1,458.6	1,763.5	Exploration - Conoco
516MF	647321.4	743570.0	1,457.6	1,798.0	Exploration - Conoco
518MF	647071.0	744436.0	1,461.2	2,061.0	Exploration - Conoco
51S	646939.4	746071.6	1,470.9	2,635.0	Exploration - Conoco
52S	650431.9	746847.1	1,476.9	1,010.0	Exploration - Conoco
55MF	647942.5	744220.1	1,463.8	1,763.0	Exploration - Conoco
56MF	650447.6	745139.6	1,465.6	1,254.0	Exploration - Conoco
58MF	649938.1	744211.6	1,459.4	1,560.0	Exploration - Conoco
60MF	648696.2	743788.8	1,461.7	2,120.0	Exploration - Conoco
62MF	649695.3	745519.5	1,465.5	2,237.0	Exploration - Conoco
67S	649445.2	746046.1	1,472.7	1,829.0	Exploration - Conoco
68MF	649704.0	744661.6	1,462.4	2,257.0	Exploration - Conoco
69MF	650695.1	744647.3	1,462.5	1,390.0	Exploration - Conoco
6S	650922.4	746292.3	1,472.9	658.0	Exploration - Conoco
70MF	650691.5	745516.1	1,465.0	1,227.0	Exploration - Conoco
80S	646944.9	746813.4	1,475.0	1,930.0	Exploration - Conoco
86MF	647945.9	745088.1	1,469.5	2,259.0	Exploration - Conoco
91S	650941.9	745952.0	1,470.5	1,202.0	Exploration - Conoco
92S	650443.9	745951.6	1,469.6	1,256.0	Exploration - Conoco
92SA	650406.2	746047.4	1,467.6	788.0	Exploration - Conoco
93S	649945.7	745951.3	1,468.4	1,285.0	Exploration - Conoco
94S	647947.1	745952.8	1,475.0	2,040.0	Exploration - Conoco
95S	647447.1	745952.4	1,472.7	1,842.0	Exploration - Conoco
96S	647945.6	746872.7	1,480.0	1,473.0	Exploration - Conoco
97MF	648197.3	743788.6	1,461.0	1,855.0	Exploration - Conoco
98MF	648196.6	744653.4	1,467.0	2,280.0	Exploration - Conoco
99MF	648446.7	745087.5	1,469.0	2,441.0	Exploration - Conoco
MCC367	648319.0	746174.0	1,475.7	941.0	Exploration - Magma
MCC368	648196.4	745951.9	1,475.2	1,044.0	Exploration - Magma
MCC369	648567.5	745739.7	1,472.5	882.0	Exploration - Magma
MCC397A	648949.4	745518.9	1,468.6	1,042.0	Exploration - Magma
MCC406	648571.4	745302.4	1,469.5	966.0	Exploration - Magma
MCC407A	648821.4	745302.4	1,468.3	1,019.0	Exploration - Magma
MCC418A	648737.1	745704.2	1,468.0	906.0	Exploration - Magma
MCC419	648446.4	745518.9	1,472.6	1,014.0	Exploration - Magma
MCC421	648271.4	745699.7	1,469.6	1,039.0	Exploration - Magma
MCC423	648696.4	745085.9	1,468.2	973.0	Exploration - Magma
MCC425	648821.4	744869.4	1,466.8	993.0	Exploration - Magma
MCC426	649071.4	744869.4	1,465.6	979.0	Exploration - Magma
MCC427	649321.4	744869.4	1,464.2	833.0	Exploration - Magma
MCC434	648946.4	744652.9	1,465.4	879.0	Exploration - Magma
MCC519	649990.0	746228.0	1,471.9	950.0	Exploration - Magma
MCC521	647133.0	746498.3	1,470.0	1,600.0	Exploration - Magma
MCC522	647718.0	745558.0	1,466.0	1,380.0	Exploration - Magma
MCC523	648476.2	746502.3	1,478.8	690.0	Exploration - Magma

Table C-3. Coreholes that Penetrate the Proposed Injection Zone

Corehole ID	Location Coordinates		Collar Elevation (feet amsl)	Total Depth (feet bgs)	Corehole Type - Responsible Company
	Easting	Northing			
MCC524	649018.0	745311.0	1,467.0	1,034.0	Exploration - Magma
MCC525	647939.0	746167.0	1,476.0	1,212.0	Exploration - Magma
MCC526	649215.8	746508.2	1,478.4	770.0	Exploration - Magma
MCC527	649798.2	745956.2	1,470.5	842.0	Exploration - Magma
MCC530	647432.0	744685.0	1,466.0	1,268.0	Exploration - Magma
MCC531	649696.0	745517.0	1,465.0	800.0	Exploration - Magma
MCC532	648696.0	744653.0	1,464.0	979.0	Exploration - Magma
MCC533	648327.8	745542.3	1,472.6	1,074.0	Exploration - Magma
MCC534	649394.4	745022.4	1,464.1	900.0	Exploration - Magma
MCC535	647744.1	745696.4	1,471.8	1,279.0	Exploration - Magma
MCC536	647979.8	745705.3	1,472.2	1,162.0	Exploration - Magma
MCC537	648068.2	745393.8	1,471.7	1,207.0	Exploration - Magma
MCC538	648063.3	745523.5	1,472.1	1,169.0	Exploration - Magma
MCC539	647470.7	745523.7	1,468.3	1,537.0	Exploration - Magma
MCC540	648178.9	745113.8	1,468.6	1,176.0	Exploration - Magma
MCC541	648465.9	744445.9	1,464.0	1,031.0	Exploration - Magma
MCC542	647864.4	747062.6	1,481.0	1,203.0	Exploration - Magma
MCC543	647695.8	746816.1	1,479.2	1,393.0	Exploration - Magma
MCC544	647696.3	745956.0	1,473.7	1,320.5	Exploration - Magma
MCC545	647675.4	746157.6	1,474.0	1,370.0	Exploration - Magma
MCC546	647829.3	746598.8	1,477.0	1,152.0	Exploration - Magma
MCC546A	647838.8	746607.0	1,477.1	1,437.0	Exploration - Magma
MCC547	647753.9	745346.4	1,468.7	1,500.0	Exploration - Magma
MCC548	647695.6	745132.6	1,467.5	1,501.0	Exploration - Magma
MCC549	648256.0	745398.4	1,471.8	1,180.0	Exploration - Magma
MCC550	648045.5	744902.1	1,467.8	1,175.0	Exploration - Magma
MCC551	648295.6	744887.7	1,467.5	1,075.0	Exploration - Magma
MCC552	647986.1	744485.9	1,464.9	1,212.0	Exploration - Magma
MCC553	647904.4	744689.3	1,466.5	1,249.0	Exploration - Magma
MCC554	648712.9	744437.2	1,464.0	918.0	Exploration - Magma
MCC555	648537.8	744872.3	1,464.7	1,060.0	Exploration - Magma
MCC556	648221.9	744471.9	1,464.7	1,073.5	Exploration - Magma
MCC557	648182.3	744265.5	1,463.4	1,062.0	Exploration - Magma
MCC558	648678.4	744250.4	1,464.3	1,025.0	Exploration - Magma
MCC559	648065.7	744012.0	1,461.8	969.0	Exploration - Magma
MCC560	648347.8	744027.5	1,461.7	920.0	Exploration - Magma
MCC561	647558.2	745729.9	1,471.1	1,480.0	Exploration - Magma
MCC562	647526.9	745308.8	1,467.5	1,479.0	Exploration - Magma
MCC563	647790.9	744855.8	1,466.3	1,319.5	Exploration - Magma
MCC564	648566.3	744007.8	1,461.8	937.0	Exploration - Magma
MCC565	647672.5	744430.4	1,463.2	1,276.0	Exploration - Magma
MCC566	648813.4	744008.1	1,461.5	917.0	Exploration - Magma
MCC567	648450.0	743799.3	1,460.6	908.0	Exploration - Magma
MCC568	647158.8	745643.5	1,467.2	1,800.0	Exploration - Magma
MCC569	647315.6	746203.8	1,473.1	1,663.0	Exploration - Magma
MCC570	647056.3	745304.3	1,465.6	530.0	Exploration - Magma
MCC570A	647050.1	745304.0	1,465.7	1,557.5	Exploration - Magma
DMA	649148.5	746381.8	1,478.7	700.0	Geotechnical Borehole

Table C-3. Coreholes that Penetrate the Proposed Injection Zone

Corehole ID	Location Coordinates		Collar Elevation (feet amsl)	Total Depth (feet bgs)	Corehole Type - Responsible Company
	Easting	Northing			
DMB	648246.9	746381.7	1,478.1	700.0	Geotechnical Borehole
DMC	650185.4	746384.9	1,471.5	610.0	Geotechnical Borehole
DMD	649740.3	746842.3	1,480.1	635.0	Geotechnical Borehole
DME	650741.5	745516.1	1,464.9	700.0	Geotechnical Borehole
DMF	649496.4	745518.9	1,466.1	392.0	Geotechnical Borehole

amsl - above mean sea level
bgs = below ground surface

CURIS RESOURCES (ARIZONA) INC.

APPLICATION TO AMEND UIC PERMIT NO. AZ396000001

ATTACHMENT D – MAPS & CROSS SECTIONS OF USDWs

Table of Contents

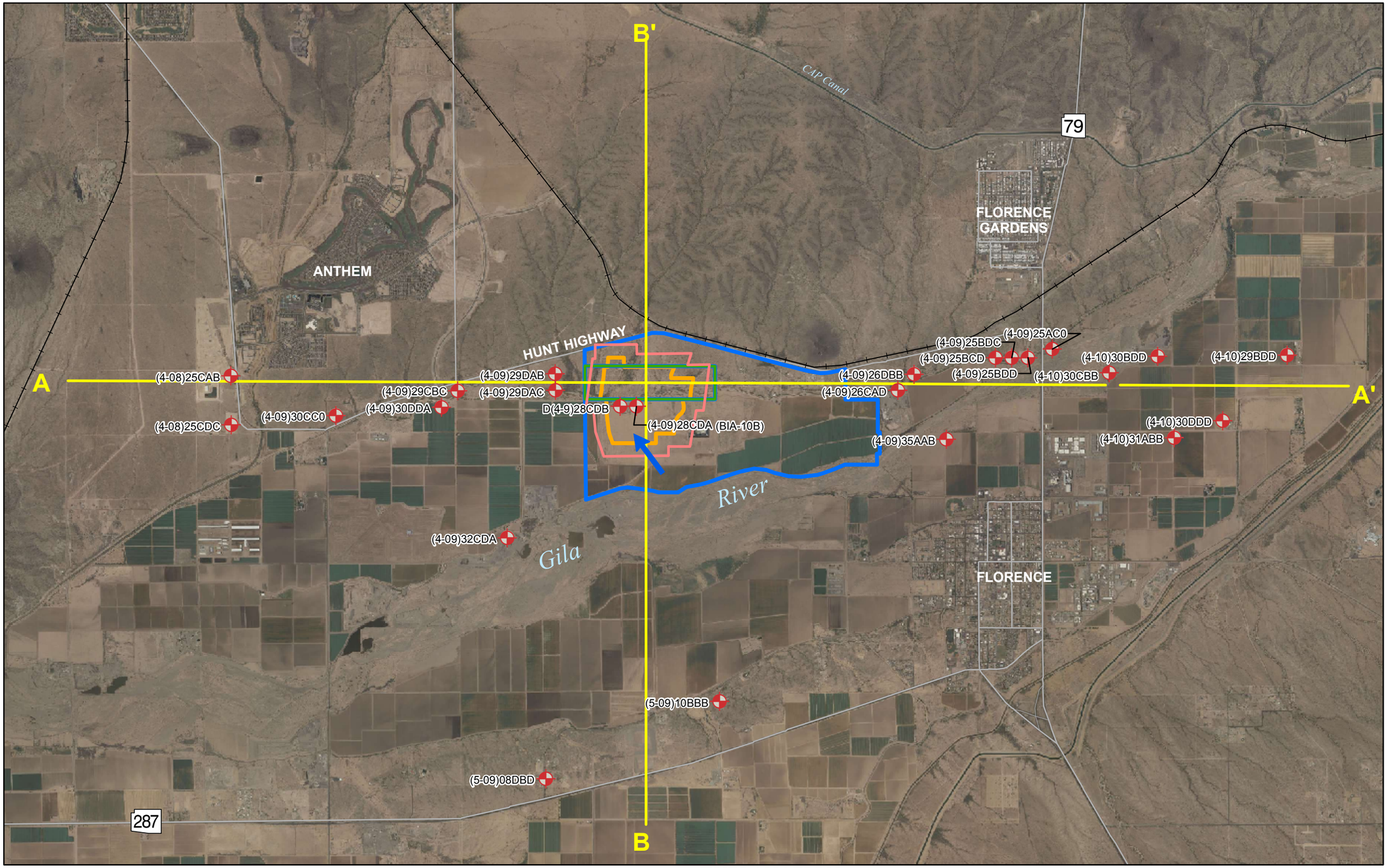
List of Figures

D.1 Introduction

This Attachment D has been prepared in support of an application (Application) by Curis Resources (Arizona) Inc. (Curis Arizona) to the United States Environmental Protection Agency (USEPA) to transfer, with amendments, Underground Injection Control Class III (Area) Permit No. AZ396000001 (UIC Permit) from Florence Copper Inc. (Florence Copper) to Curis Arizona.

As required for Attachment D of USEPA Form 7520-6, this attachment includes maps and cross sections that depict the vertical limits of all underground sources of drinking water (USDWs) within the Area of Review (AOR) defined in Attachment A of this Application. In Figures D-3 through D-8, blue shading indicates the proposed injection zone within the AOR, and purple shading indicates the extent of USDWs outside of the Aquifer Exemption boundary.

Wells BIA-9 and BIA-10B will be plugged and abandoned in accordance with the Plugging and Abandonment Plan as discussed in Attachment Q of this Application prior to the commencement of commercial *in-situ* copper recovery operations.



EXPLANATION

- AREA OF REVIEW
- ISCR AREA
- CURIS PROPERTY BOUNDARY
- STATE MINERAL LEASE BOUNDARY
- A—A' REGIONAL CROSS SECTION LOCATION LINE
- LOCATION OF WELL REPRESENTED IN CROSS SECTIONS A-A' AND B-B'
- TYPICAL GROUNDWATER FLOW DIRECTION IN USDWs WITHIN THE AREA OF REVIEW

Brown AND Caldwell

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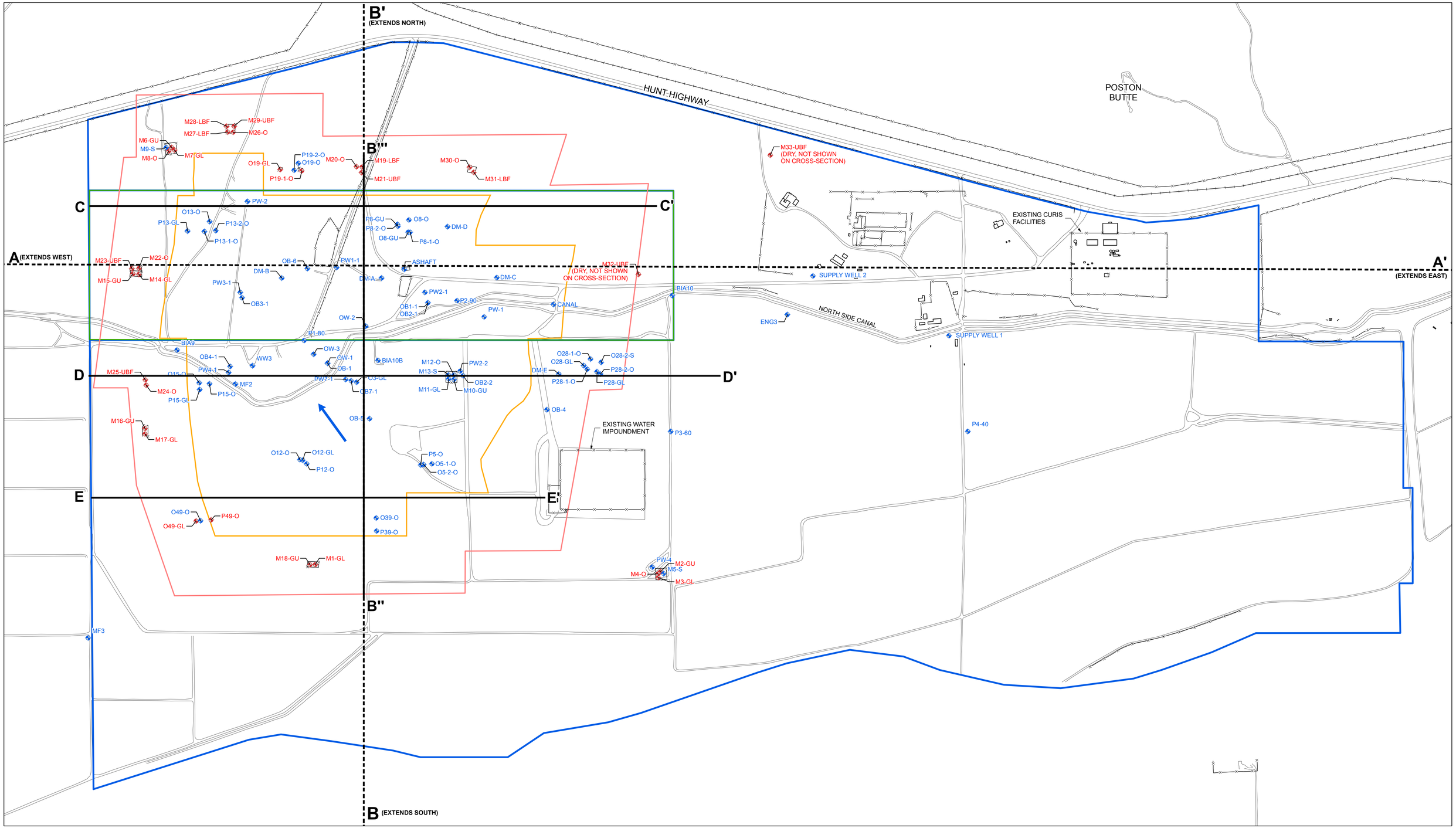
Figure D-1
REGIONAL CROSS SECTION LOCATION MAP
CURIS RESOURCES (ARIZONA) INC.
FLORENCE, ARIZONA

P:\Hunter Dickinson\Curis GIS\MXDs\G138799040.mxd Updated: March 24, 2011



EXPLANATION

- POC WELL
- NON POC WELL
- ISCR AREA
- STATE MINERAL LEASE BOUNDARY
- CURIS PROPERTY BOUNDARY
- AREA OF REVIEW
- REGIONAL CROSS SECTION LOCATION LINES A-A' AND B-B'
- ISCR AREA CROSS SECTION LOCATION LOCATION LINES B"-B"', C-C', D-D' AND E-E'
- TYPICAL GROUNDWATER FLOW DIRECTION IN USDW's WITHIN THE AREA OF REVIEW

Brown AND Caldwell

0 200 400
SCALE IN FEET

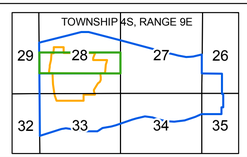
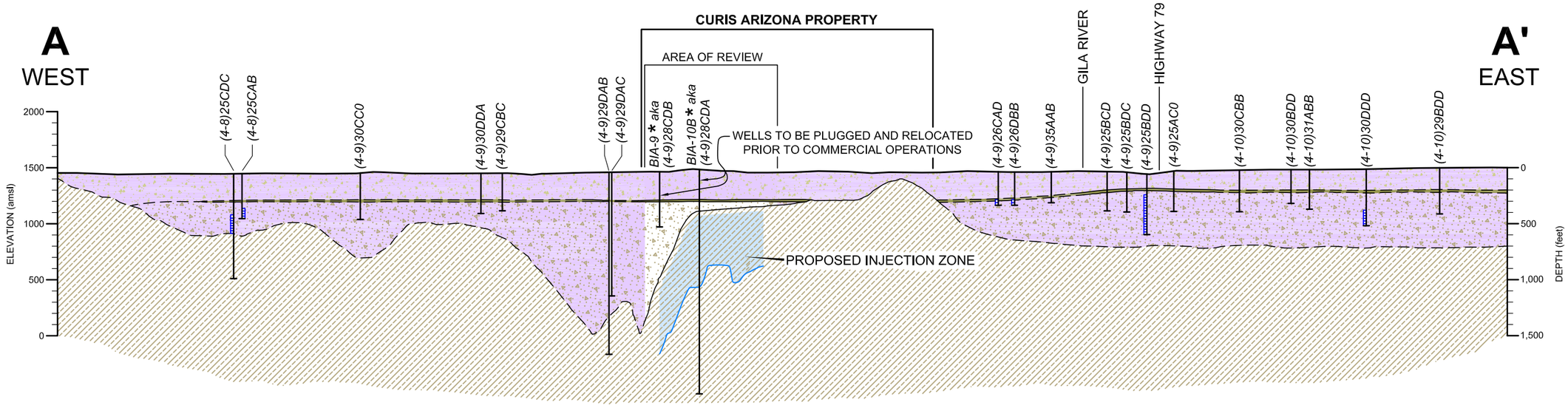


Figure D-2
ISCR AREA
CROSS SECTION
LOCATION MAP
CURIS RESOURCES (ARIZONA) INC.
FLORENCE, ARIZONA

P:\Hunter Dickinson\Curis GIS\MXDs\Significant Amendment\G138799130010.mxd Updated: March 24, 2011



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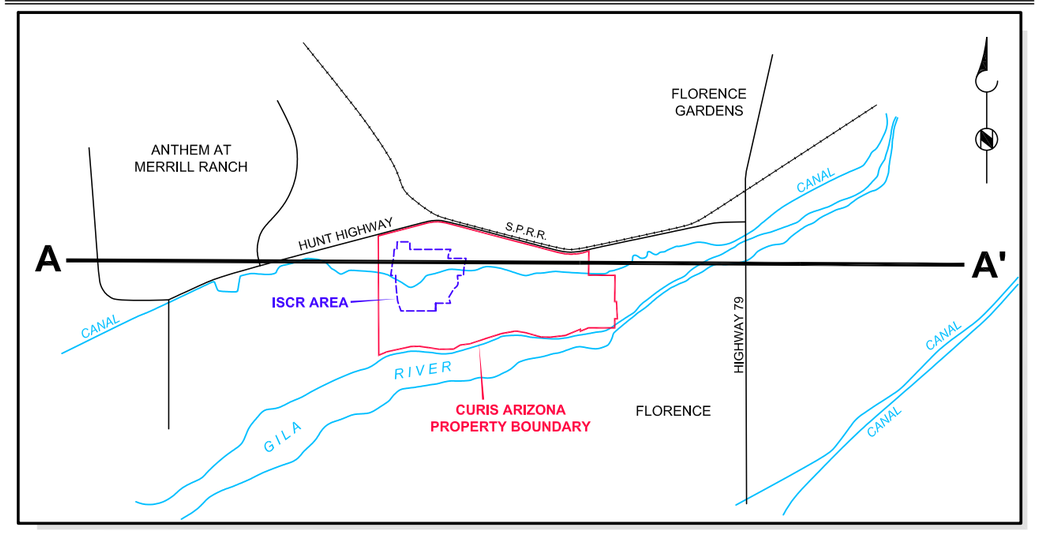

EXPLANATION

- UPPER BASIN FILL ALLUVIAL UNIT
- MIDDLE FINE-GRAINED UNIT
- LOWER BASIN FILL ALLUVIAL UNIT
- BEDROCK
- VERTICAL LIMITS OF USDWs WITHIN THE AREA OF REVIEW
- INFERRED EXTENT OF MIDDLE FINE-GRAINED UNIT

APPROXIMATE WELL LOCATION
(GENERALLY PROJECTED ONTO CROSS-SECTION)

- SCREENED INTERVAL (WHERE DATA IS AVAILABLE)
- TOTAL DEPTH OF BOREHOLE

HORIZONTAL SCALE: 1" = 4,000'
VERTICAL SCALE: 1" = 1,000'
4X VERTICAL EXAGGERATION

NOTES:
1. BEDROCK SURFACE CONTOURS COMPILED BY BROWN AND CALDWELL FROM EXISTING WATER WELL LOGS, EXPLORATORY COREHOLE LOGS AND REGIONAL GRAVITY SURVEYS (BHP COPPER INC. APP APPLICATION, VOLUME II FIGURES 3.4-2 (II) AND 3,4-3 (II), 1996).
2. * WELLS BIA-9 AND BIA-10B (LOCATED IN THE PROPOSED IN-SITU COPPER RECOVERY AREA) WILL BE PLUGGED AND RELOCATED PRIOR TO COMMERCIAL OPERATIONS.
3. UNIT CONTACTS DASHED WHERE INFERRED

Brown AND Caldwell

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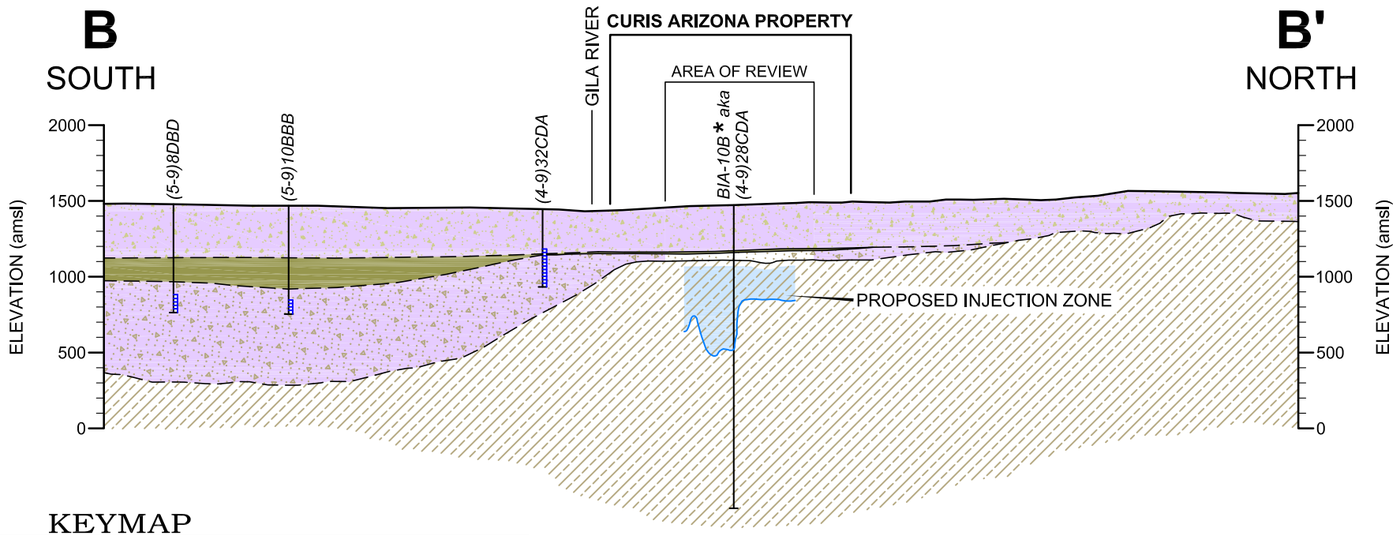
Figure D-3

GENERALIZED REGIONAL GEOLOGIC CROSS SECTION A-A'

CURIS RESOURCES (ARIZONA) INC.
FLORENCE, ARIZONA

P:\Hunter Dickinson\138799 - Curis Florence Copper Permitting\Drawings\ES\138799042-2.dwg Mar 24, 2011 - 9:17am jcollier



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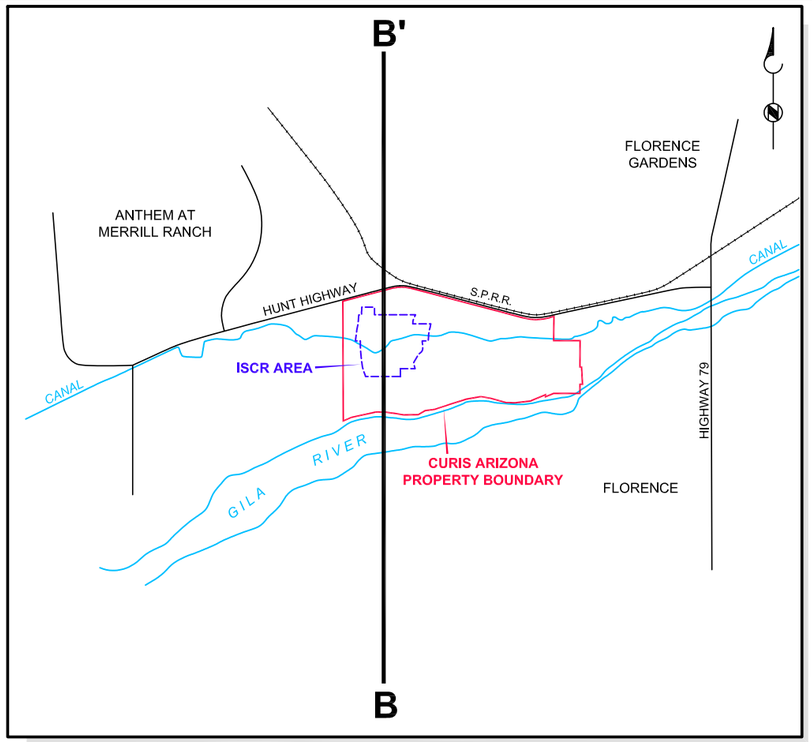

EXPLANATION

- UPPER BASIN FILL ALLUVIAL UNIT
- MIDDLE FINE-GRAINED UNIT
- LOWER BASIN FILL ALLUVIAL UNIT
- BEDROCK
- VERTICAL LIMITS OF USDWs WITHIN THE AREA OF REVIEW
- INFERRED EXTENT OF MIDDLE FINE-GRAINED UNIT

APPROXIMATE WELL LOCATION
(GENERALLY PROJECTED ONTO CROSS-SECTION)

- SCREENED INTERVAL (WHERE DATA IS AVAILABLE)
- TOTAL DEPTH OF BOREHOLE

HORIZONTAL SCALE: 1" = 4,000'
VERTICAL SCALE: 1" = 1,000'

4X VERTICAL EXAGGERATION

NOTES:
1. BEDROCK SURFACE CONTOURS COMPILED BY BROWN AND CALDWELL FROM EXISTING WATER WELL LOGS, EXPLORATORY COREHOLE LOGS AND REGIONAL GRAVITY SURVEYS (BHP COPPER INC. APP APPLICATION, VOLUME II FIGURES 3.4-2 (II) AND 3.4-3 (II), 1996).
2. * WELL BIA-10B (LOCATED IN THE PROPOSED IN-SITU COPPER RECOVERY AREA) WILL BE PLUGGED AND RELOCATED PRIOR TO COMMERCIAL OPERATIONS.
3. MIDDLE FINE-GRAINED UNIT SHOWN AT WELLS (5-9)8DBD, (5-9)10BBB AND (4-9)32CDA ESTIMATED FROM ADWR WELL REPORTS.
4. UNIT CONTACTS DASHED WHERE INFERRED.

Brown AND Caldwell

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Figure D-4

GENERALIZED REGIONAL GEOLOGIC CROSS SECTION B-B'

CURIS RESOURCES (ARIZONA) INC.
FLORENCE, ARIZONA

P:\Hunter Dickinson\138799 - Curis Florence Copper Permitting\Drawings\ES\138799051-2.dwg Mar 24, 2011 - 11:27am jcollier

B" SOUTH

B''' NORTH

PROJECTED ~ 450 EAST TO CROSS-SECTION

INTERSECTION OF CROSS-SECTION E-E'

INTERSECTION OF CROSS-SECTION D-D'

INTERSECTION OF CROSS-SECTION A-A'

INTERSECTION OF CROSS-SECTION C-C'

ISCR AREA

ISCR AREA

507MF 495MF 433MF 32MF 434MF 426MF 48MF MCC-524 397MF 399MF 18S 370S 361S 350S 45S 348S

M18-GU M1-GL M21-UBF M19-LBF M20-O

1433.23 (VARIES)

ALLUVIUM

UBFU

MFGU

LBFU

ELEVATION (FEET AMSL)

1500 1400 1300 1200 1100 1000 900 800 700 600 500 400 300 200 100 0 -100 -200 -300 -400 -500 -600 -700 -800 -900 -1000 -1100 -1200 -1300 -1400

SIDEWINDER (?) FAULT ZONE

FAULT ZONE

GRANODIORITE

QUARTZ MONZONITE

PARTY LINE (?) FAULT ZONE

SCALE

150' 75' 0 VERTICAL

0 75' 150' HORIZONTAL

EXPLANATION

- ALLUVIUM
- SAND, SILT AND CLAY
- SAND, BOULDERS AND CLAY
- SAND, GRAVEL AND BOULDERS
- SAND AND GRAVEL
- SAND, GRAVEL AND CLAY
- SILT AND CLAY
- BASALT
- UBFU UPPER BASIN FILL UNIT
- MFGU MIDDLE FINE-GRAINED UNIT (CONFINING FORMATION)
- LBFU LOWER BASIN FILL UNIT
- VERTICAL LIMITS OF USDWs WITHIN THE AREA OF REVIEW
- PROPOSED INJECTION ZONE
- GRANODIORITE PORPHYRY
- QUARTZ MONZONITE PORPHYRY
- DIABASE / DIORITE
- A ANDESITE
- D DACITE
- L QUARTZ LATITE
- INTERPRETED UNCONFORMITY
- LBFU/OXIDE CONTACT
- OXIDE/SULFIDE CONTACT (DASHED WHERE INFERRED)
- 391MF COREHOLE ID
- EXISTING COREHOLES
- M21-UBF POC WELL SCREENED IN THE UBFU
- M19-LBF POC WELL SCREENED IN THE LBFU
- M20-O POC WELL SCREENED IN THE OXIDE UNIT
- SCREENED INTERVAL OF POC WELL
- TOTAL DEPTH OF BOREHOLE

NOTE: POC WELLS ARE PROJECTED ONTO THE GEOLOGIC CROSS SECTION LINES. DUE TO CHANGES IN THE DEPTH TO BEDROCK ACROSS THE SITE, THE PROJECTED SCREENED INTERVAL OF EACH POC WELL MAY NOT BE REPRESENTED BY THE UNIT SHOWN ON THE CROSS SECTION. UNIT CONTACT AND GEOLOGY WAS DEVELOPED BY BHP COPPER (1995) AND IS BASED ON COREHOLE DATA.

KEYMAP

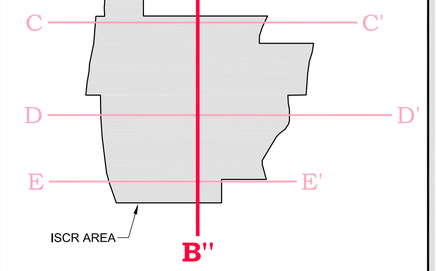

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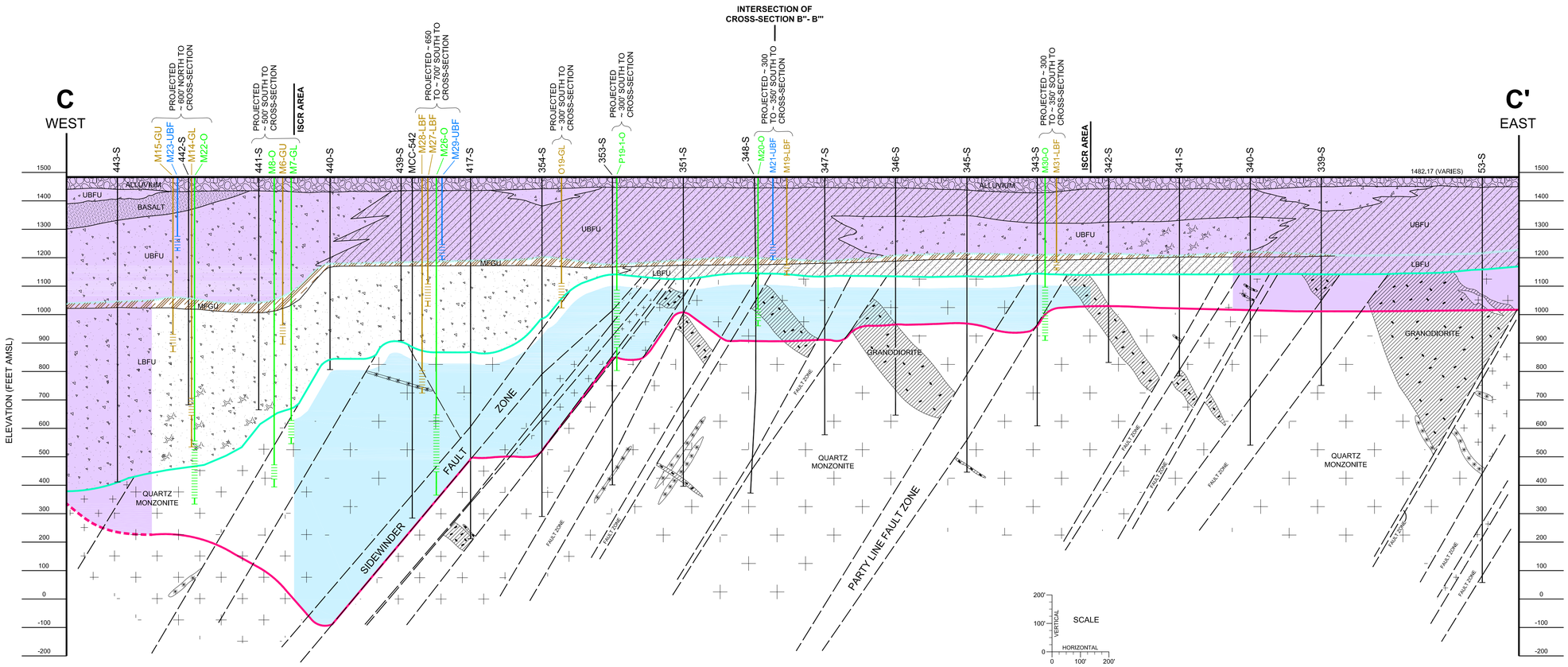
Figure D-5

GENERALIZED GEOLOGIC CROSS SECTION B''-B'''

CURIS RESOURCES (ARIZONA) INC.
FLORENCE, ARIZONA

P:\Hunter Dickinson\138799 - Curis Florence Copper Permitting\Drawings\ES\138799050-2.dwg Mar 24, 2011 - 10:21am jcollier



EXPLANATION

- ALLUVIUM
- SAND, SILT AND CLAY
- SAND, BOULDERS AND CLAY
- SAND, GRAVEL AND BOULDERS
- SAND AND GRAVEL
- SAND, GRAVEL AND CLAY
- SILT AND CLAY
- BASALT
- UBFU — UPPER BASIN FILL UNIT
- MFGU — MIDDLE FINE-GRAINED UNIT (CONFINING FORMATION)
- LBFU — LOWER BASIN FILL UNIT
- VERTICAL LIMITS OF USDWs WITHIN THE AREA OF REVIEW
- PROPOSED INJECTION ZONE
- GRANODIORITE PORPHYRY
- QUARTZ MONZONITE PORPHYRY
- DIABASE / DIORITE
- INTERPRETED UNCONFORMITY
- LBFU/OXIDE CONTACT
- OXIDE/SULFIDE CONTACT
- 439-S — COREHOLE ID
- EXISTING COREHOLES
- M23-LBF — POC WELL SCREENED IN THE UBFU
- M27-LBF — POC WELL SCREENED IN THE LBFU
- M8-O — POC WELL SCREENED IN THE OXIDE UNIT
- SCREENED INTERVAL OF POC WELL
- TOTAL DEPTH OF BOREHOLE

NOTE: POC WELLS ARE PROJECTED ONTO THE GEOLOGIC CROSS SECTION LINES. DUE TO CHANGES IN THE DEPTH TO BEDROCK ACROSS THE SITE, THE PROJECTED SCREENED INTERVAL OF EACH POC WELL MAY NOT BE REPRESENTED BY THE UNIT SHOWN ON THE CROSS SECTION. UNIT CONTACT AND GEOLOGY WAS DEVELOPED BY BHP COPPER (1995) AND IS BASED ON COREHOLE DATA.

KEYMAP

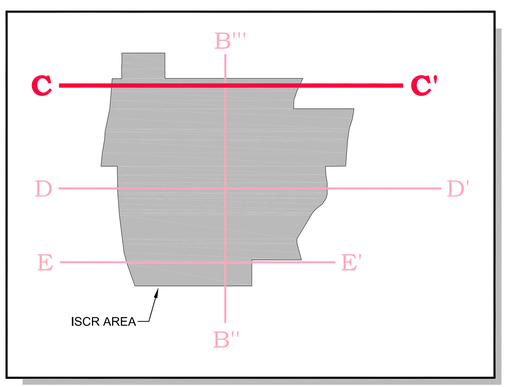


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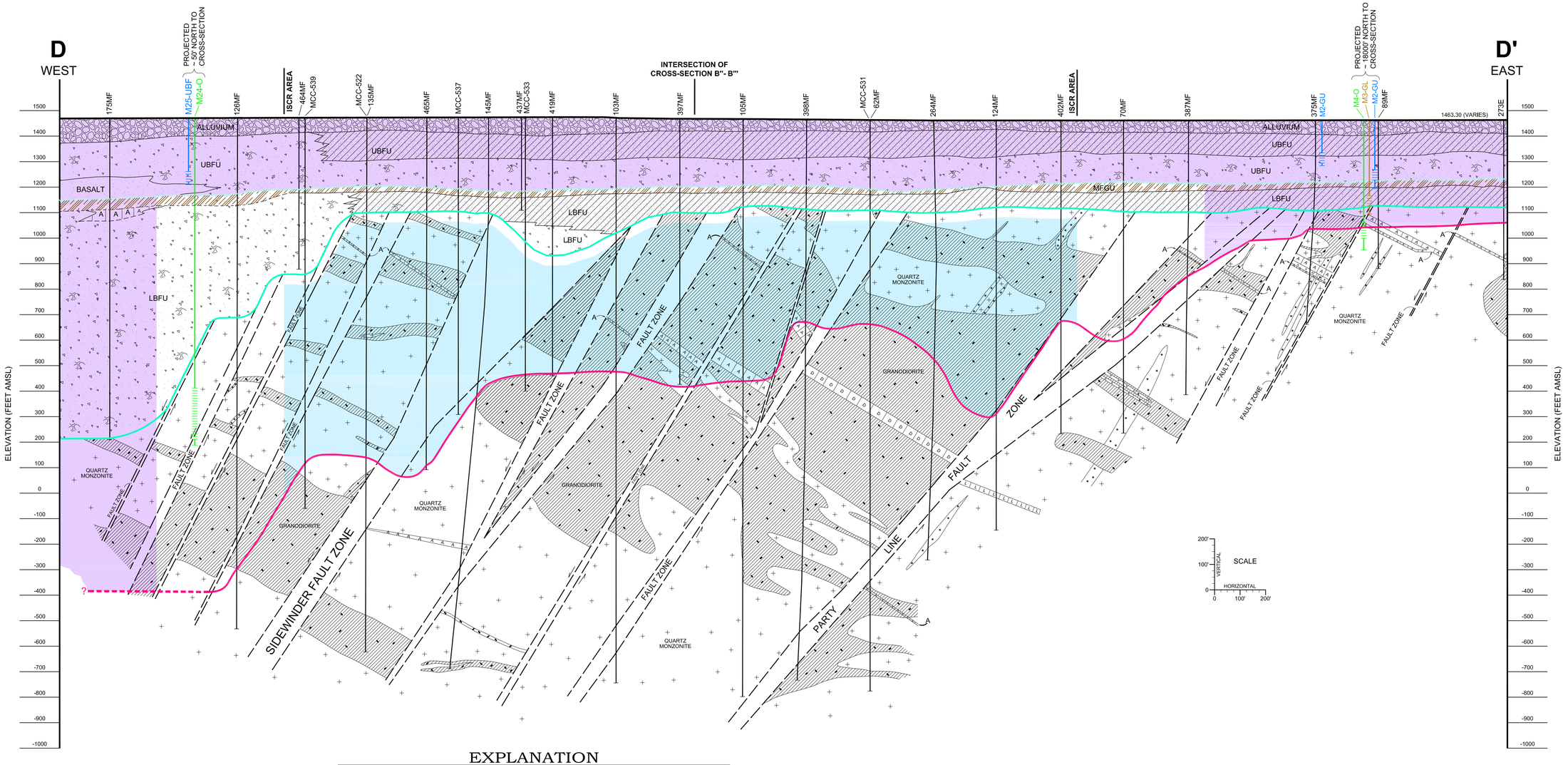
Figure D-6

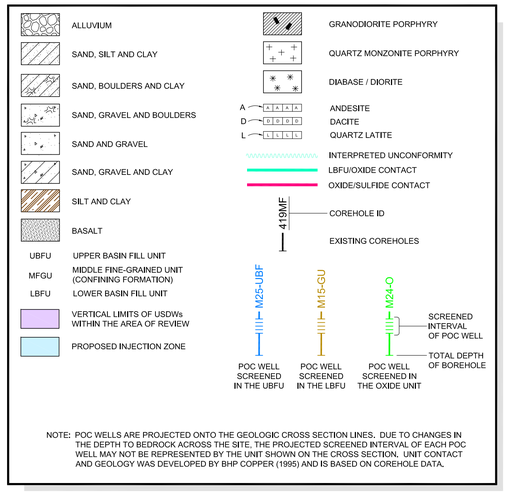
GENERALIZED GEOLOGIC CROSS SECTION C-C'

CURIS RESOURCES (ARIZONA) INC.
FLORENCE, ARIZONA

P:\Hunter Dickinson\138799 - Curis Florence Copper Permitting\Drawings\ES\138799047-2.dwg Mar 24, 2011 - 10:24am jcollier



EXPLANATION



NOTE: POC WELLS ARE PROJECTED ONTO THE GEOLOGIC CROSS SECTION LINES. DUE TO CHANGES IN THE DEPTH TO BEDROCK ACROSS THE SITE, THE PROJECTED SCREENED INTERVAL OF EACH POC WELL MAY NOT BE REPRESENTED BY THE UNIT SHOWN ON THE CROSS SECTION. UNIT CONTACT AND GEOLOGY WAS DEVELOPED BY BHP COPPER (1995) AND IS BASED ON COREHOLE DATA.

KEYMAP

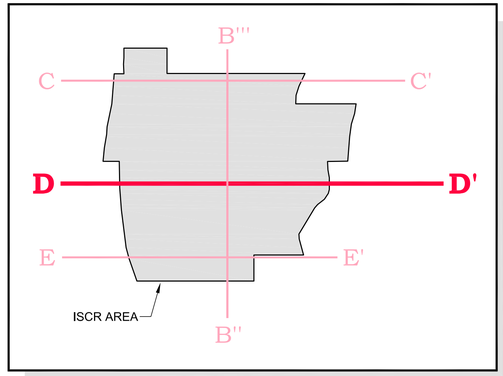


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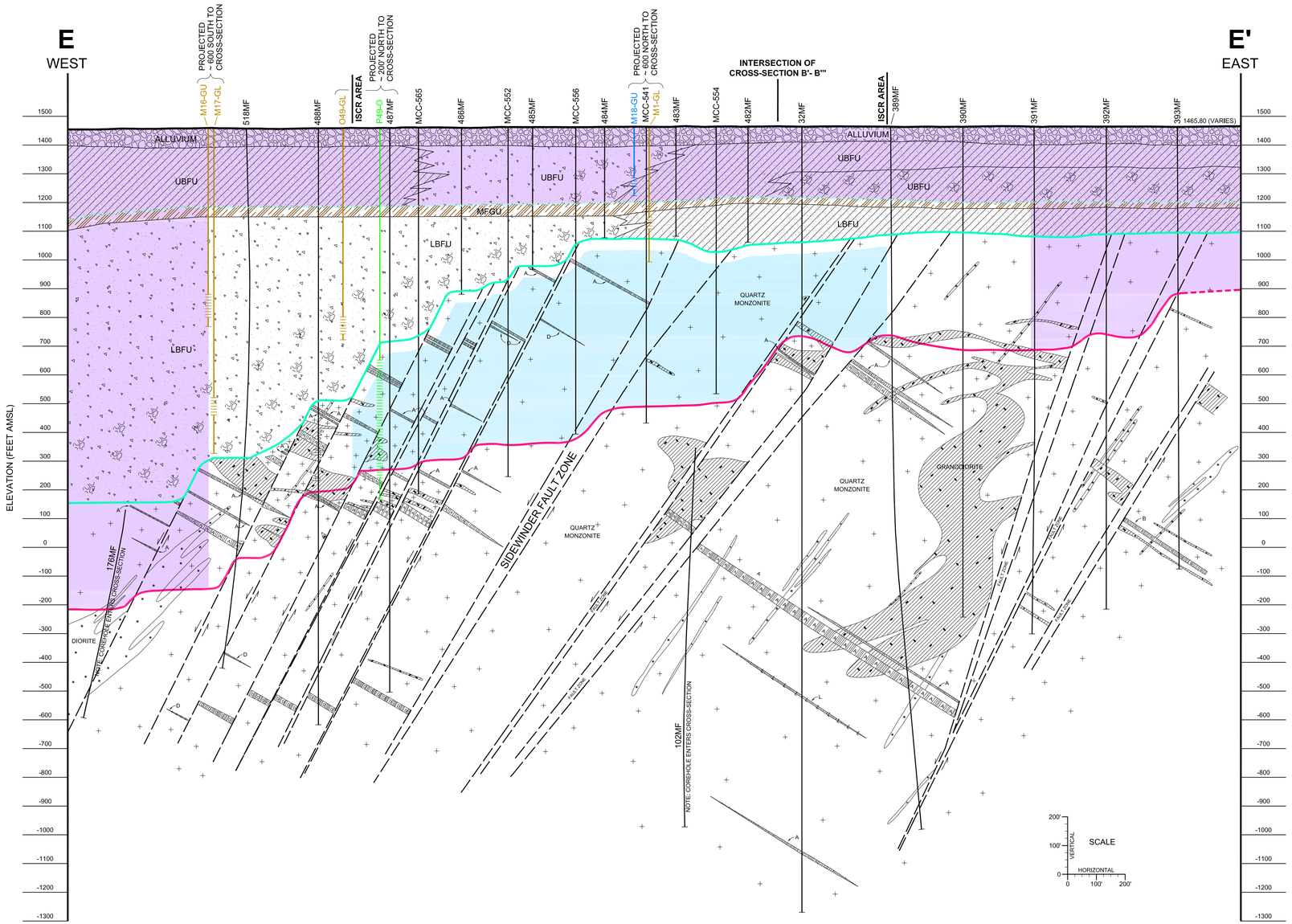
Figure D-7

GENERALIZED GEOLOGIC CROSS SECTION D-D'

CURIS RESOURCES (ARIZONA) INC.
FLORENCE, ARIZONA

P:\Hunter Dickinson\138799 - Curis Florence Copper Permitting\Drawings\ES\138799048-2.dwg Mar 24, 2011 - 10:25am jcollier



EXPLANATION

- ALLUVIUM
- SAND, SILT AND CLAY
- SAND, BOULDERS AND CLAY
- SAND, GRAVEL AND BOULDERS
- SAND AND GRAVEL
- SAND, GRAVEL AND CLAY
- SILT AND CLAY
- BASALT
- UBFU — UPPER BASIN FILL UNIT
- MFGU — MIDDLE FINE-GRAINED UNIT (CONFINING FORMATION)
- LBFU — LOWER BASIN FILL UNIT
- VERTICAL LIMITS OF USDWs WITHIN THE AREA OF REVIEW
- PROPOSED INJECTION ZONE
- GRANODIORITE PORPHYRY
- QUARTZ MONZONITE PORPHYRY
- DIABASE / DIORITE
- A — ANDESITE
- D — DACITE
- L — QUARTZ LATITE
- INTERPRETED UNCONFORMITY
- LBFU/OXIDE CONTACT
- OXIDE/SULFIDE CONTACT
- 391MF — COREHOLE ID
- EXISTING COREHOLES
- M2-GU — POC WELL SCREENED IN THE UBFU
- M17-GL — POC WELL SCREENED IN THE LBFU
- P49-Q — POC WELL SCREENED IN THE OXIDE UNIT
- SCREENED INTERVAL OF POC WELL
- TOTAL DEPTH OF BOREHOLE

NOTE: POC WELLS ARE PROJECTED ONTO THE GEOLOGIC CROSS SECTION LINES. DUE TO CHANGES IN THE DEPTH TO BEDROCK ACROSS THE SITE, THE PROJECTED SCREENED INTERVAL OF EACH POC WELL MAY NOT BE REPRESENTED BY THE UNIT SHOWN ON THE CROSS SECTION. UNIT CONTACT AND GEOLOGY WAS DEVELOPED BY BHP COPPER (1995) AND IS BASED ON COREHOLE DATA.

KEYMAP

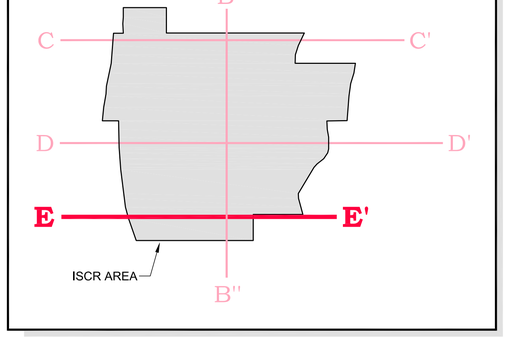


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Figure D-8

GENERALIZED GEOLOGIC CROSS SECTION E-E'

CURIS RESOURCES (ARIZONA) INC.
FLORENCE, ARIZONA

P:\Hunter Dickinson\138799 - Curis Florence Copper Permitting\Drawings\ES\138799049-2.dwg Mar 24, 2011 - 10:21am jcollier

CURIS RESOURCES (ARIZONA) INC.

APPLICATION TO AMEND UIC PERMIT NO. AZ396000001

ATTACHMENT F – MAPS & CROSS SECTIONS OF GEOLOGIC LITHOLOGY

Table of Contents

List of Figures

F.1 Introduction

This Attachment F has been prepared in support of an application by Curis Resources (Arizona) Inc. (Curis Arizona) to the United States Environmental Protection Agency (USEPA) to transfer, with amendments, Underground Injection Control Class III (Area) Permit No. AZ396000001 (UIC Permit) from Florence Copper Inc. (Florence Copper) to Curis Arizona.

As required for Attachment F of USEPA Form 7520-6, this attachment includes maps and cross sections depicting the geologic structure in the area of Curis Arizona's proposed Florence Copper Project.

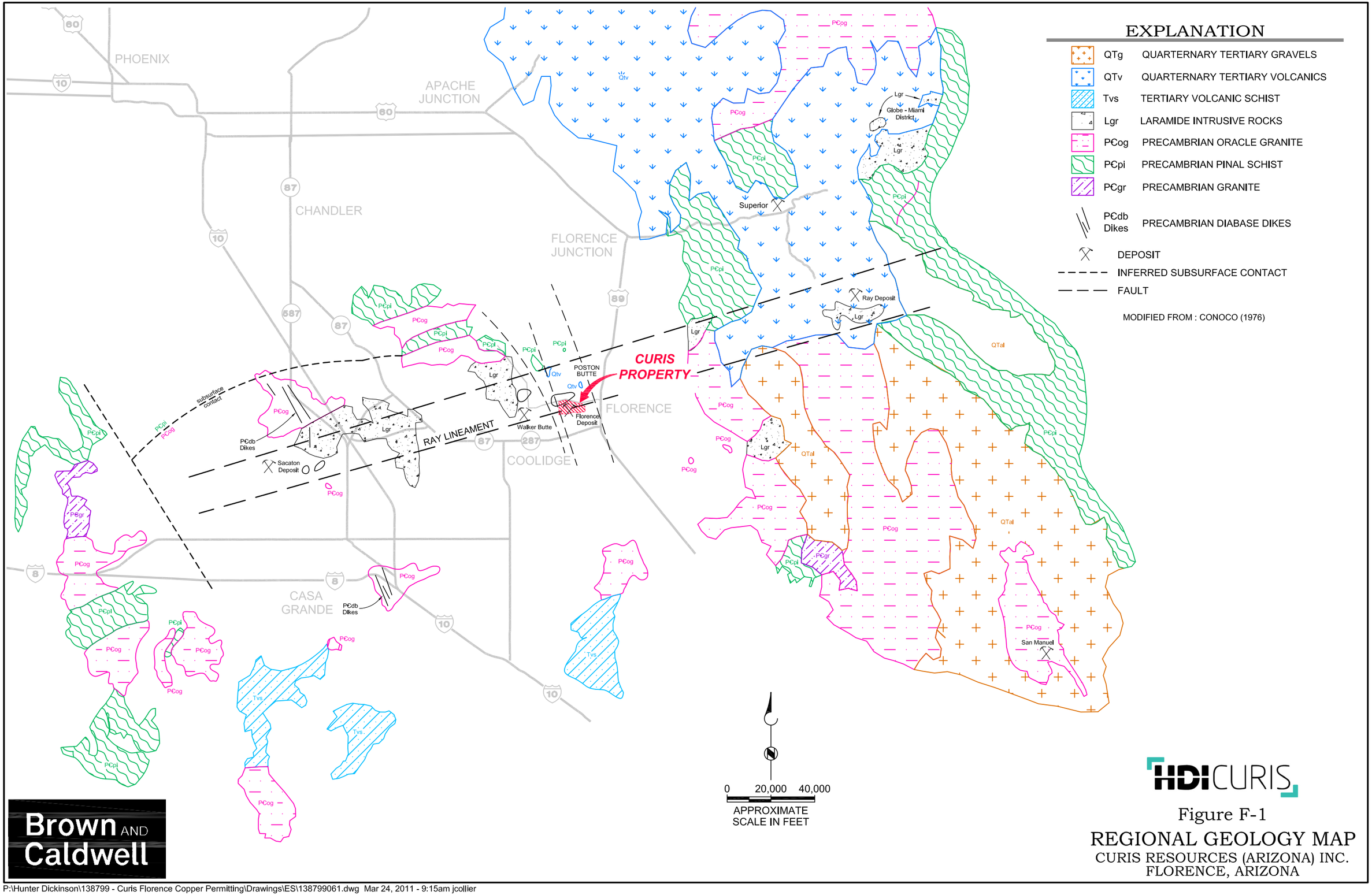

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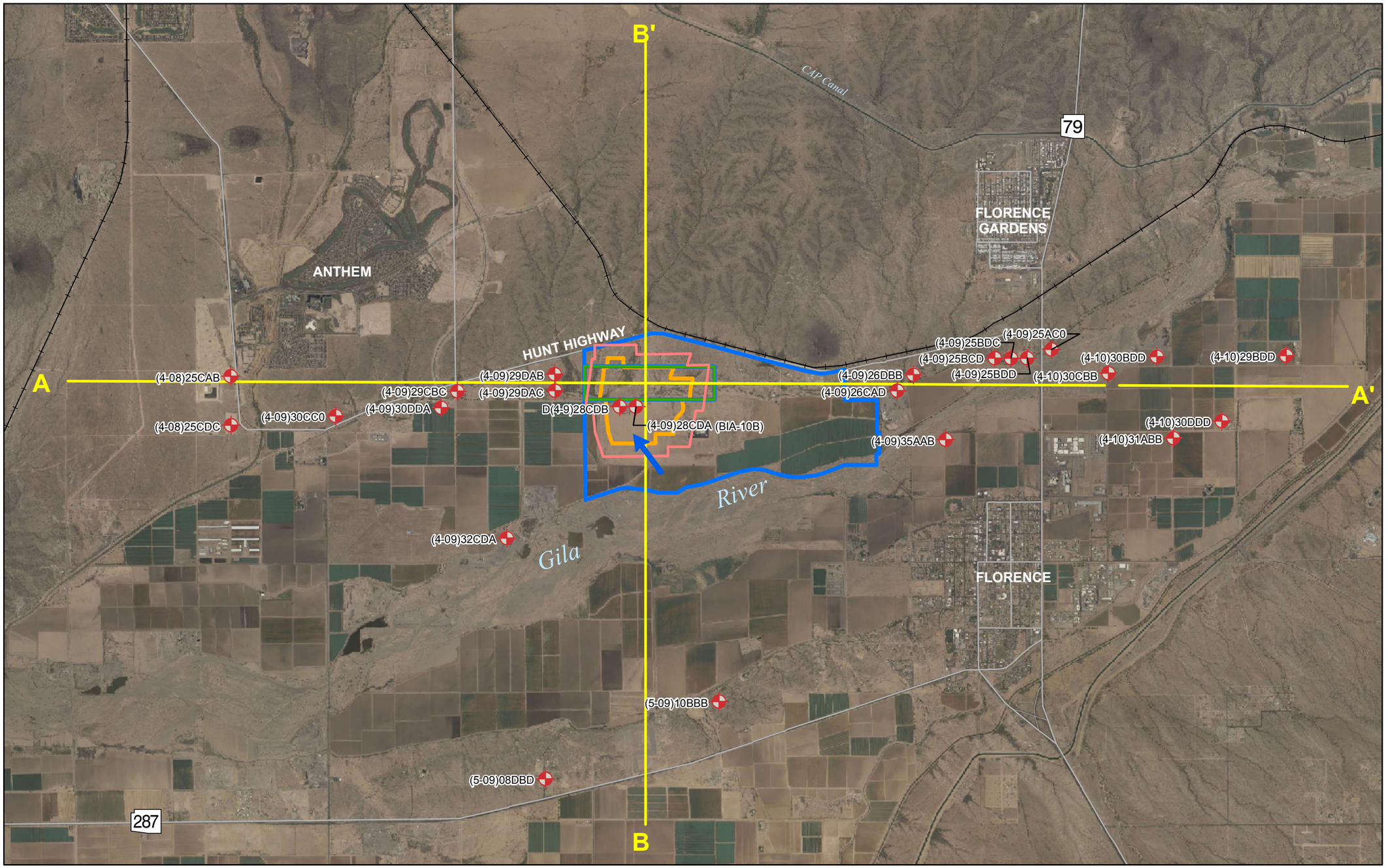
Figure F-1

REGIONAL GEOLOGY MAP

CURIS RESOURCES (ARIZONA) INC.
FLORENCE, ARIZONA

P:\Hunter Dickinson\138799 - Curis Florence Copper Permitting\Drawings\ES\138799061.dwg Mar 24, 2011 - 9:15am jcollier



EXPLANATION

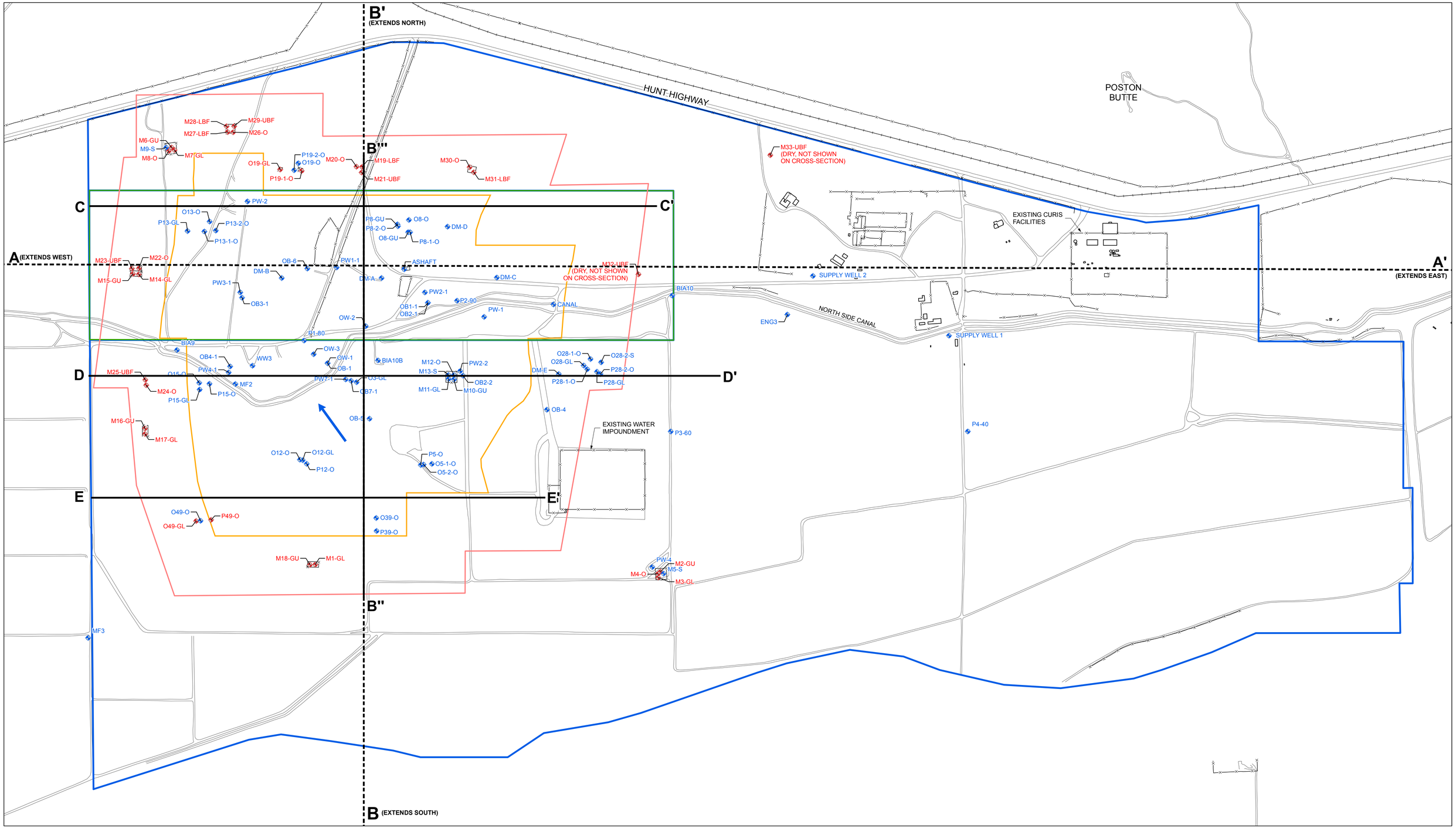
- AREA OF REVIEW
- ISCR AREA
- CURIS PROPERTY BOUNDARY
- STATE MINERAL LEASE BOUNDARY
- A—A' REGIONAL CROSS SECTION LOCATION LINE
- LOCATION OF WELL REPRESENTED IN CROSS SECTIONS A-A' AND B-B'
- TYPICAL GROUNDWATER FLOW DIRECTION IN USDWs WITHIN THE AREA OF REVIEW

Brown AND Caldwell

HDI CURIS

Figure F-2
REGIONAL CROSS SECTION LOCATION MAP
CURIS RESOURCES (ARIZONA) INC.
FLORENCE, ARIZONA

P:\Hunter Dickinson\Curis GIS\MXDs\G138799040.mxd Updated: March 24, 2011



Brown AND Caldwell

0 200 400
SCALE IN FEET

EXPLANATION

- POC WELL
- NON POC WELL
- ISCR AREA
- STATE MINERAL LEASE BOUNDARY
- CURIS PROPERTY BOUNDARY
- AREA OF REVIEW
- REGIONAL CROSS SECTION LOCATION LINES A-A' AND B-B'
- ISCR AREA CROSS SECTION LOCATION LOCATION LINES B"-B"', C-C', D-D' AND E-E'
- TYPICAL GROUNDWATER FLOW DIRECTION IN USDW's WITHIN THE AREA OF REVIEW

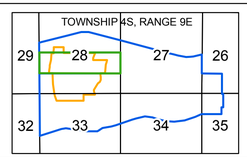
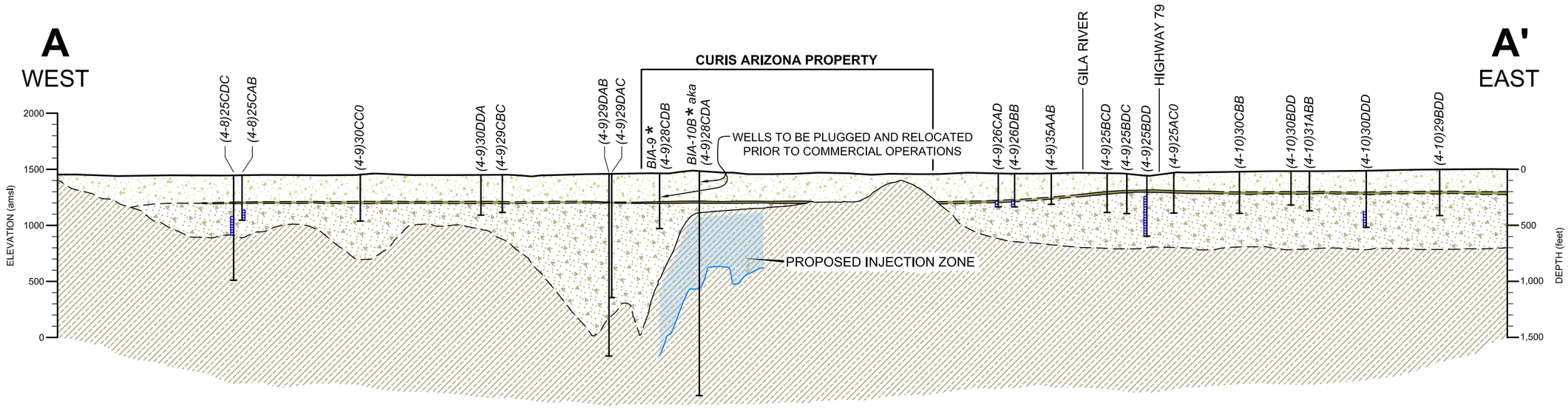
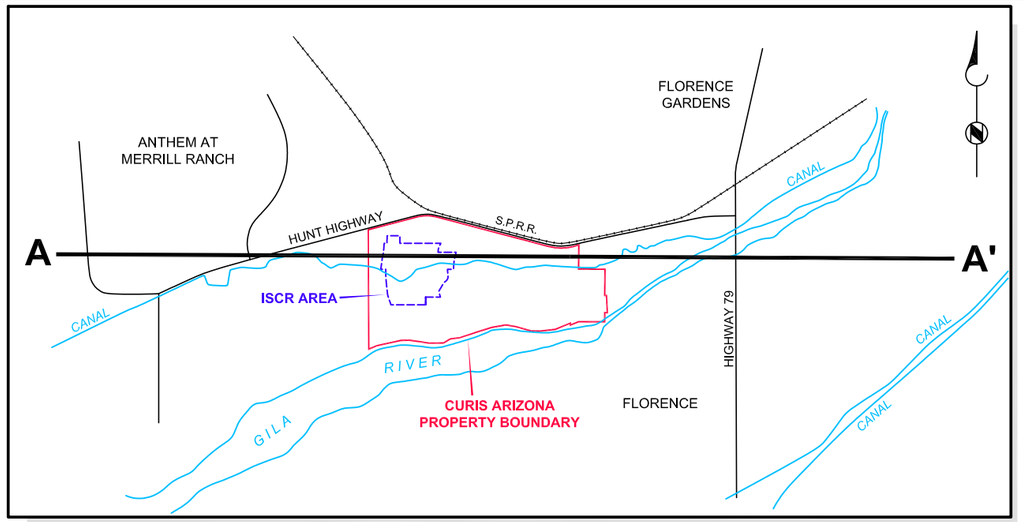


Figure F-3
ISCR AREA
CROSS SECTION
LOCATION MAP
CURIS RESOURCES (ARIZONA) INC.
FLORENCE, ARIZONA

P:\Hunter Dickinson\Curis GIS\MXDs\Significant Amendment\G138799130010.mxd Updated: March 24, 2011



KEYMAP



EXPLANATION

- UPPER BASIN FILL ALLUVIAL UNIT
- MIDDLE FINE-GRAINED UNIT
- LOWER BASIN FILL ALLUVIAL UNIT
- BEDROCK

APPROXIMATE WELL LOCATION
(GENERALLY PROJECTED ONTO CROSS SECTION)

- SCREENED INTERVAL (WHERE DATA IS AVAILABLE)
- TOTAL DEPTH OF BOREHOLE

NOTES: BEDROCK SURFACE CONTOURS COMPILED BY BROWN AND CALDWELL FROM EXISTING WATER WELL LOGS, EXPLORATORY COREHOLE LOGS AND REGIONAL GRAVITY SURVEYS (BHP COPPER INC. APP APPLICATION, VOLUME II FIGURES 3.4-2 (II) AND 3.4-3 (II), 1996).

* WELLS BIA-9 AND BIA-10B (LOCATED IN THE PROPOSED IN-SITU COPPER RECOVERY AREA) WILL BE PLUGGED AND RELOCATED PRIOR TO COMMERCIAL OPERATIONS.

UNIT CONTACTS DASHED WHERE INFERRED

HORIZONTAL SCALE: 1" = 4,000'
VERTICAL SCALE: 1" = 1,000'

4X VERTICAL EXAGGERATION

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Figure F-4

GENERALIZED REGIONAL GEOLOGIC CROSS SECTION A-A'

CURIS RESOURCES (ARIZONA) INC.
FLORENCE, ARIZONA

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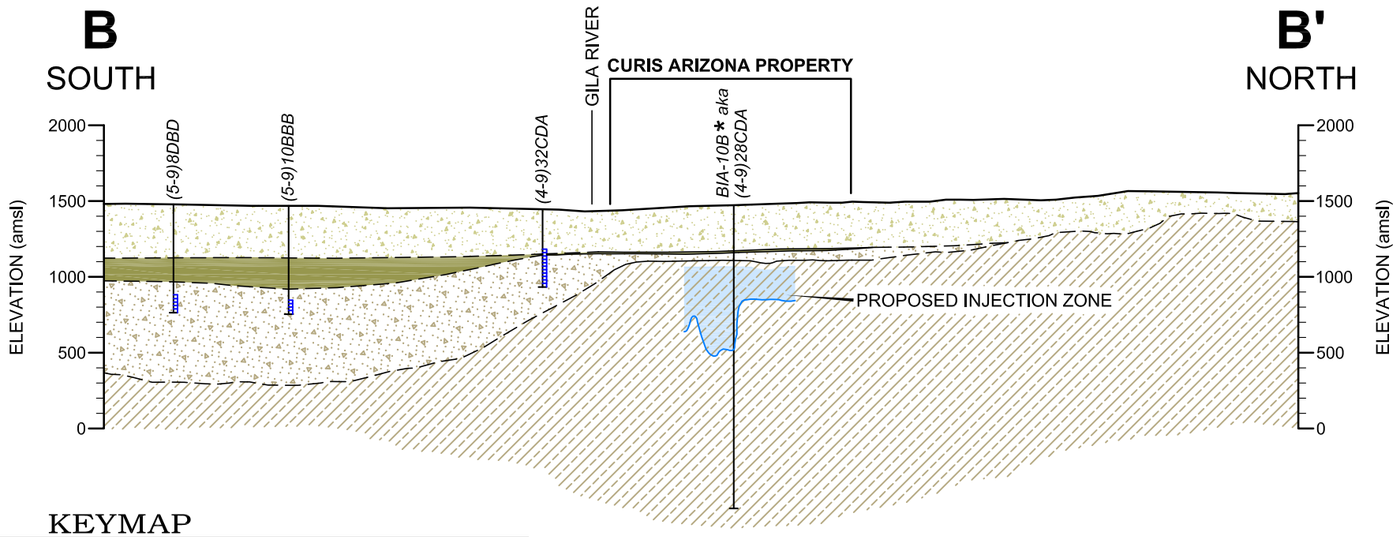
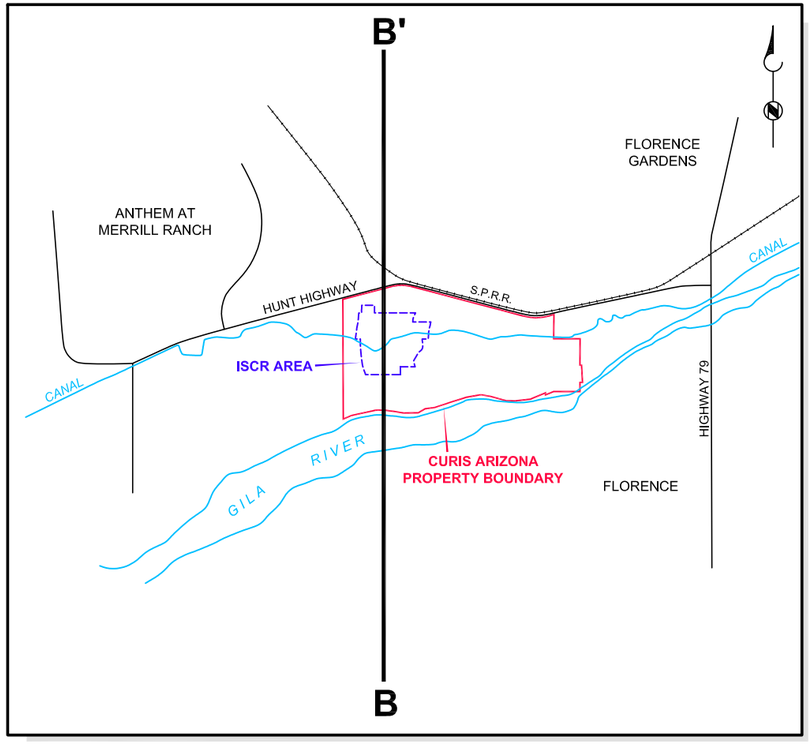


KEYMAP



EXPLANATION

- UPPER BASIN FILL ALLUVIAL UNIT
- MIDDLE FINE-GRAINED UNIT
- LOWER BASIN FILL ALLUVIAL UNIT
- BEDROCK

APPROXIMATE WELL LOCATION
(GENERALLY PROJECTED ONTO CROSS SECTION)

- SCREENED INTERVAL (WHERE DATA IS AVAILABLE)
- TOTAL DEPTH OF BOREHOLE

HORIZONTAL SCALE: 1" = 4,000'
VERTICAL SCALE: 1" = 1,000'

4X VERTICAL EXAGGERATION

NOTES:
1. BEDROCK SURFACE CONTOURS COMPILED BY BROWN AND CALDWELL FROM EXISTING WATER WELL LOGS, EXPLORATORY COREHOLE LOGS AND REGIONAL GRAVITY SURVEYS (BHP COPPER INC. APP APPLICATION, VOLUME II FIGURES 3.4-2 (II) AND 3.4-3 (II), 1996).
2. * WELL BIA-10B (LOCATED IN THE PROPOSED IN-SITU COPPER RECOVERY AREA) WILL BE PLUGGED AND RELOCATED PRIOR TO COMMERCIAL OPERATIONS.
3. MIDDLE FINE-GRAINED UNIT SHOWN AT WELLS (5-9)8DBD, (5-9)10BBB AND (4-9)32CDA ESTIMATED FROM ADWR WELL REPORTS.
4. UNIT CONTACTS DASHED WHERE INFERRED.

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Figure F-5

GENERALIZED REGIONAL GEOLOGIC CROSS SECTION B-B'

CURIS RESOURCES (ARIZONA) INC.
FLORENCE, ARIZONA

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B" SOUTH

B''' NORTH

PROJECTED ~ 450' EAST TO CROSS-SECTION

INTERSECTION OF CROSS-SECTION E-E'

INTERSECTION OF CROSS-SECTION D-D'

INTERSECTION OF CROSS-SECTION A-A'

INTERSECTION OF CROSS-SECTION C-C'

ISCR AREA

507MF 495MF 433MF 32MF 434MF 426MF 48MF MCC-524 397MF 399MF 18S 370S 361S 350S 45S 348S

M18-GU M1-GL M21-UBF M19-LBF M20-Q

1433.23 (VARIES)

ALLUVIUM

UBFU

MFGU

LBFU

GRANODIORITE

QUARTZ MONZONITE

FAULT ZONE

SIDEWINDER (?) FAULT ZONE

PARTY LINE (?) FAULT ZONE

ELEVATION (FEET AMSL)

1500 1400 1300 1200 1100 1000 900 800 700 600 500 400 300 200 100 0 -100 -200 -300 -400 -500 -600 -700 -800 -900 -1000 -1100 -1200 -1300 -1400

SCALE

150' 75' 0 VERTICAL

HORIZONTAL 0 75' 150'

EXPLANATION

- ALLUVIUM
- SAND, SILT AND CLAY
- SAND, BOULDERS AND CLAY
- SAND, GRAVEL AND BOULDERS
- SAND AND GRAVEL
- SAND, GRAVEL AND CLAY
- SILT AND CLAY
- BASALT
- UBFU UPPER BASIN FILL UNIT
- MFGU MIDDLE FINE-GRAINED UNIT (CONFINING FORMATION)
- LBFU LOWER BASIN FILL UNIT
- PROPOSED INJECTION ZONE
- GRANODIORITE PORPHYRY
- QUARTZ MONZONITE PORPHYRY
- DIABASE / DIORITE
- A ANDESITE
- D DACITE
- L QUARTZ LATITE
- INTERPRETED UNCONFORMITY
- LBFU/OXIDE CONTACT
- OXIDE/SULFIDE CONTACT (DASHED WHERE INFERRED)
- 391MF COREHOLE ID
- EXISTING COREHOLES
- M21-UBF POC WELL SCREENED IN THE UBFU
- M19-LBF POC WELL SCREENED IN THE LBFU
- M20-Q POC WELL SCREENED IN THE OXIDE UNIT
- SCREENED INTERVAL OF POC WELL
- TOTAL DEPTH OF BOREHOLE

NOTE: POC WELLS ARE PROJECTED ONTO THE GEOLOGIC CROSS SECTION LINES. DUE TO CHANGES IN THE DEPTH TO BEDROCK ACROSS THE SITE, THE PROJECTED SCREENED INTERVAL OF EACH POC WELL MAY NOT BE REPRESENTED BY THE UNIT SHOWN ON THE CROSS SECTION. UNIT CONTACT AND GEOLOGY WAS DEVELOPED BY BHP COPPER (1995) AND IS BASED ON COREHOLE DATA.

KEYMAP

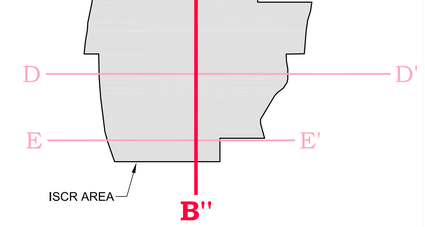

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Figure F-6

GENERALIZED GEOLOGIC CROSS SECTION B''-B'''

CURIS RESOURCES (ARIZONA) INC.
FLORENCE, ARIZONA

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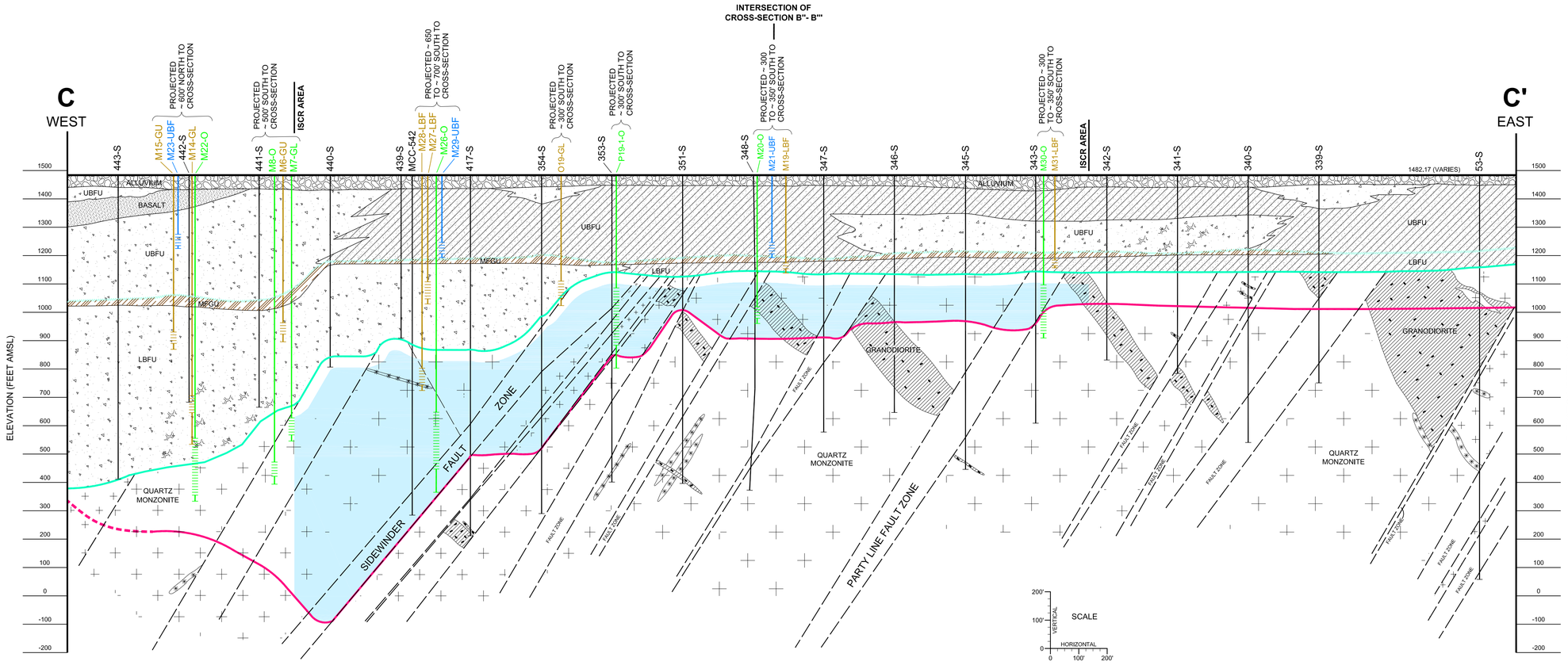
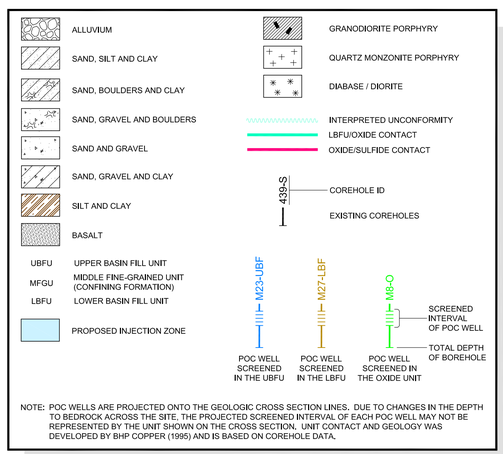


EXPLANATION



NOTE: POC WELLS ARE PROJECTED ONTO THE GEOLOGIC CROSS SECTION LINES. DUE TO CHANGES IN THE DEPTH TO BEDROCK ACROSS THE SITE, THE PROJECTED SCREENED INTERVAL OF EACH POC WELL MAY NOT BE REPRESENTED BY THE UNIT SHOWN ON THE CROSS SECTION. UNIT CONTACT AND GEOLOGY WAS DEVELOPED BY BHP COPPER (1995) AND IS BASED ON COREHOLE DATA.

KEYMAP

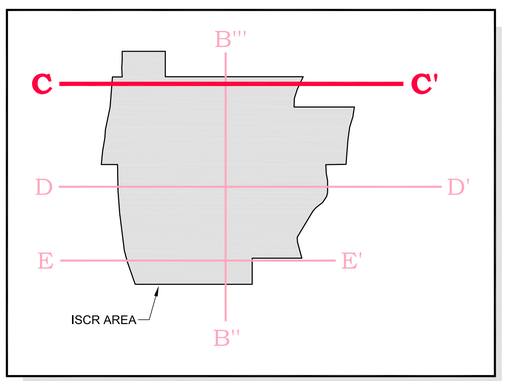


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Figure F-7

GENERALIZED GEOLOGIC CROSS SECTION C-C'

CURIS RESOURCES (ARIZONA) INC.
FLORENCE, ARIZONA

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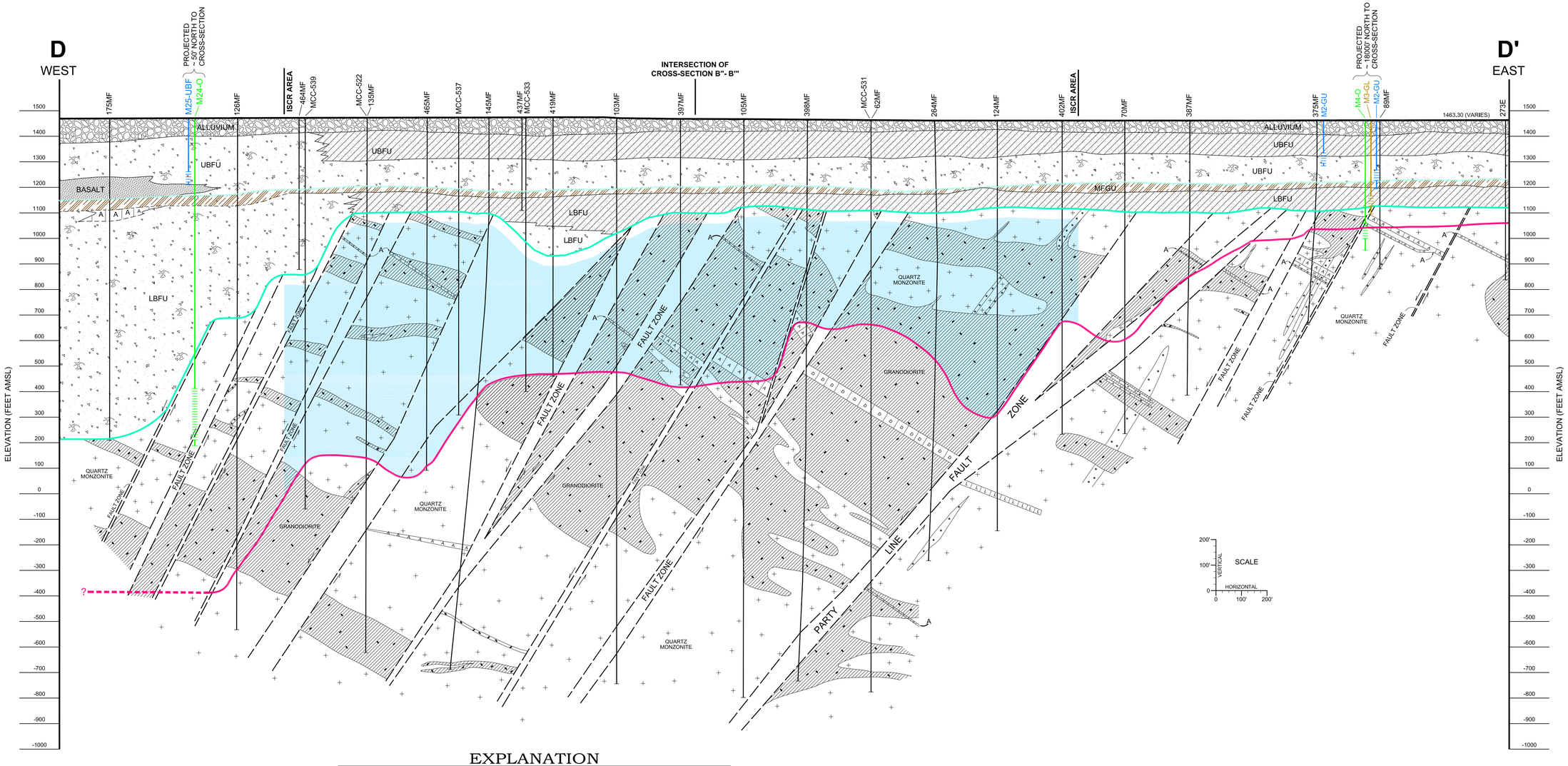

EXPLANATION

- ALLUVIUM
- SAND, SILT AND CLAY
- SAND, BOULDERS AND CLAY
- SAND, GRAVEL AND BOULDERS
- SAND AND GRAVEL
- SAND, GRAVEL AND CLAY
- SILT AND CLAY
- BASALT
- UBFU — UPPER BASIN FILL UNIT
- MFGU — MIDDLE FINE-GRAINED UNIT (CONFINING FORMATION)
- LBFU — LOWER BASIN FILL UNIT
- PROPOSED INJECTION ZONE
- GRANODIORITE PORPHYRY
- QUARTZ MONZONITE PORPHYRY
- DIABASE / DIORITE
- A — ANDESITE
- D — DACITE
- L — QUARTZ LATITE
- INTERPRETED UNCONFORMITY
- LBFU/OXIDE CONTACT
- OXIDE/SULFIDE CONTACT
- 419MF — COREHOLE ID
- EXISTING COREHOLES
- M25-UBF — POC WELL SCREENED IN THE UBFU
- M15-GU — POC WELL SCREENED IN THE LBFU
- M24-O — POC WELL SCREENED IN THE OXIDE UNIT
- SCREENED INTERVAL OF POC WELL
- TOTAL DEPTH OF BOREHOLE

NOTE: POC WELLS ARE PROJECTED ONTO THE GEOLOGIC CROSS SECTION LINES. DUE TO CHANGES IN THE DEPTH TO BEDROCK ACROSS THE SITE, THE PROJECTED SCREENED INTERVAL OF EACH POC WELL MAY NOT BE REPRESENTED BY THE UNIT SHOWN ON THE CROSS SECTION. UNIT CONTACT AND GEOLOGY WAS DEVELOPED BY BHP COPPER (1995) AND IS BASED ON COREHOLE DATA.

KEYMAP

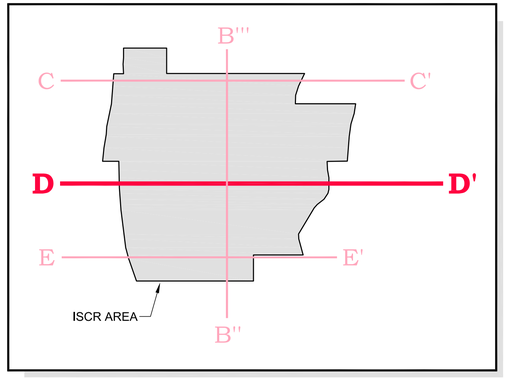

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Figure F-8

GENERALIZED GEOLOGIC CROSS SECTION D-D'

CURIS RESOURCES (ARIZONA) INC.
FLORENCE, ARIZONA

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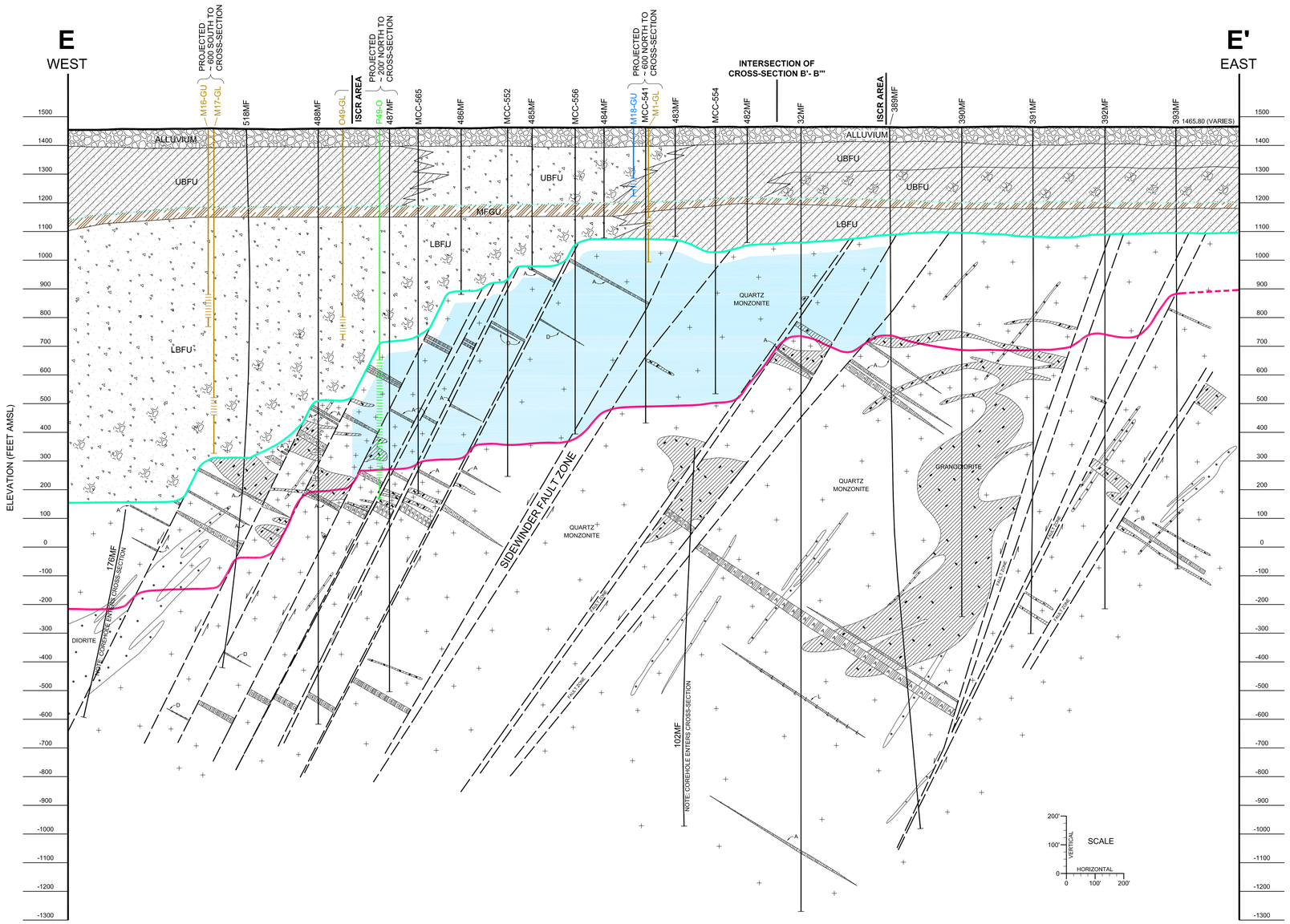

EXPLANATION

- ALLUVIUM
- SAND, SILT AND CLAY
- SAND, BOULDERS AND CLAY
- SAND, GRAVEL AND BOULDERS
- SAND AND GRAVEL
- SAND, GRAVEL AND CLAY
- SILT AND CLAY
- BASALT
- UBFU — UPPER BASIN FILL UNIT
- MFGU — MIDDLE FINE-GRAINED UNIT (CONFINING FORMATION)
- LBFU — LOWER BASIN FILL UNIT
- PROPOSED INJECTION ZONE
- GRANODIORITE PORPHYRY
- QUARTZ MONZONITE PORPHYRY
- DIABASE / DIORITE
- A — ANDESITE
- D — DACITE
- L — QUARTZ LATITE
- INTERPRETED UNCONFORMITY
- LBFU/OXIDE CONTACT
- OXIDE/SULFIDE CONTACT
- 391MF — COREHOLE ID
- EXISTING COREHOLES
- M2-GU — POC WELL SCREENED IN THE UBFU
- M17-GL — POC WELL SCREENED IN THE LBFU
- P49-O — POC WELL SCREENED IN THE OXIDE UNIT
- SCREENED INTERVAL OF POC WELL
- TOTAL DEPTH OF BOREHOLE

NOTE: POC WELLS ARE PROJECTED ONTO THE GEOLOGIC CROSS SECTION LINES. DUE TO CHANGES IN THE DEPTH TO BEDROCK ACROSS THE SITE, THE PROJECTED SCREENED INTERVAL OF EACH POC WELL MAY NOT BE REPRESENTED BY THE UNIT SHOWN ON THE CROSS SECTION. UNIT CONTACT AND GEOLOGY WAS DEVELOPED BY BHP COPPER (1995) AND IS BASED ON COREHOLE DATA.

KEYMAP

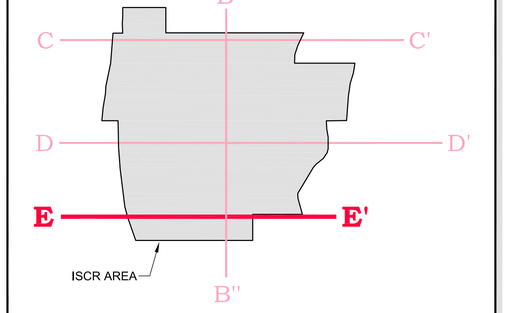

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Figure F-9

GENERALIZED GEOLOGIC CROSS SECTION E-E'

CURIS RESOURCES (ARIZONA) INC.
FLORENCE, ARIZONA